APPENDIX F

GEOTECHNICAL REPORT

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August 6, 2024

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Principal
Tappé Architects, Inc.
Six Edgerly Place
Boston, MA 02116

RE: Geotechnical Engineering Feasibility Study
Proposed Martha's Vineyard Regional High School Renovations
Oak Bluffs, Massachusetts

INTRODUCTION

Weston & Sampson Engineers, Inc. (Weston & Sampson) is pleased to present this letter report summarizing our geotechnical engineering feasibility study for the proposed improvements to the Martha's Vineyard Regional High School (MVRHS) in Oak Bluffs, Massachusetts. Based on preliminary information provided by Tappé Architects, Inc. (Tappé), we understand that the proposed project may include renovations and building expansion, or demolition and replacement of the existing high school. The purpose of our feasibility study was to complete preliminary subsurface investigations and geotechnical analyses and provide a discussion of geotechnical engineering considerations for the proposed site development.

Our services included an Environmental Limited Subsurface Investigation (LSI) as required by the Massachusetts School Building Authority (MSBA) grant program. Select soil samples obtained from the geotechnical borings were screened in the field for the presence of volatile organic compounds (VOCs) with a photoionization detector (PID). Samples were also submitted to an environmental testing laboratory for preliminary soil disposal characterization analyses. Our LSI report with details on environmental sampling and testing, laboratory test results, and related environmental considerations for the proposed project are provided under a separate cover.

The geotechnical considerations and recommendations presented in this report are preliminary and are based on our understanding of the proposed project as described herein, subsurface conditions encountered at discrete exploration locations, and the provisions of the Limitations section of this report. Additional investigations, laboratory testing, analyses, and recommendations will be necessary for final design and construction once specific project details such as building locations, floor elevations, and grading are developed.

Additional information on the use of this report is provided in the document titled "Important Information about this Geotechnical Engineering Report" by Geoprofessional Business Association (GBA), Inc., included as ***Attachment D***.

EXISTING CONDITIONS AND PROPOSED IMPROVEMENTS

Martha's Vineyard Regional High School is located at 100 Edgartown Vineyard Haven Road in Oak Bluffs, Massachusetts (the "Site"), as shown in ***Figure 1 – Site Locus***. The Site is bordered by residential properties to the west, wooded areas to the east and south, and by Edgartown Vineyard Haven Road to the north. Sanderson Avenue roughly bisects the Site, running from north to south.

The Site is currently developed with the existing school building west of Sanderson Ave, asphalt paved driveways and parking areas, landscaped areas, athletic fields, a running track, and tennis courts as shown in ***Figure 2 – Site Plan.*** An existing grading plan was not provided to us in preparation of this report, but surface grades at this site appear relatively level.

The project is currently in the conceptual design phase. Based on preliminary alternative sketches provided by Tappé on May 29, 2024, included as ***Attachment A***, we understand the project is expected to include renovations and additions to the existing school, or construction of a new school building east of Sanderson Avenue. We anticipate that the proposed new school building/additions will be one- to two-story, steel-framed structures. Associated site improvements are anticipated to include new access roadways and parking areas, tennis courts, athletic fields, stormwater management features, and underground utilities.

Preliminary structural information was not available at the time of this report. Based on our experience with similar structures we assume building loads will be up to about 200 kips for columns and 3 kips per lineal foot (klf) for walls, and that slab loads will be less than 250 pounds per square foot (psf). It is anticipated that cuts and fills of up to about 3 feet relative to existing site grades will be required to achieve final grades. We assume new underground utilities will be up to about 10 feet below existing grades, and that no below-grade levels (e.g., basements or crawl spaces) are planned for the new building areas.

SUBSURFACE CONDITIONS

Geologic Setting

Surficial geology information available from the Massachusetts Bureau of Geographic Information (Mass GIS) indicates the Site is located in an area of stratified sand and gravel deposits.

Based on the Bedrock Geologic Map of Massachusetts (Zen et al., 1983), Bedrock geology is mapped as unconsolidated Cretaceous sediments. Shallow bedrock and outcrops are not mapped in the immediate site vicinity.

Subsurface Explorations

Subsurface conditions at the Site were explored on June 26 and 27, 2024 by advancing eight borings (B-1 through B-8) at the approximate locations shown on ***Figure 2***.

Northern Drill Service, Inc., of Northborough, Massachusetts completed each boring to a depth of approximately 27 feet using an all-terrain (ATV)-mounted drill rig and hollow-stem auger drilling methods. Standard penetration tests (SPTs) were conducted in each boring by driving a split spoon sampler with an automatic hammer in general accordance with ASTM D1586. Sampling intervals were generally every 2 feet through the upper 6 feet, and every 5 feet thereafter. A groundwater monitoring well was installed in boring B-7 following completion of drilling. The remaining borings were backfilled with soil cuttings. A Weston & Sampson geotechnical engineering representative observed drilling activities and prepared logs of each boring. Boring logs are included as ***Attachment B***.

Subsurface Conditions

The subsurface conditions encountered in our explorations are generally consistent with site history and the mapped geology. The subsurface conditions are described in the following sections. Subsurface conditions described below have been interpreted based on a limited number of explorations that were observed by Weston & Sampson. Variations may occur and should be expected between locations. The strata boundaries shown in our boring logs are based on our interpretations and the actual transitions may be gradual. Refer to the boring logs for detailed descriptions of the soil samples collected.

The general Unified Soil Classification System (USCS) designation for each stratum is included in the descriptions below in parentheses.

Surface Materials – Borings B-1 through B-6 were advanced in grass-covered landscape areas and encountered approximately 2 to 5 inches of topsoil. Boring B-7 was located in a bare ground area with no vegetation. Boring B-8 was advanced in a parking area where the surface conditions consisted of approximately 4 inches of AC pavement.

Subsoil – Subsoil was encountered below the surface materials in borings B-2, B-5 and B-6, and extended to depths ranging from approximately 2 to 3 feet. The subsoil generally consisted of loose to very dense, light brown to brown SAND with little non-plastic fines and up to little gravel (SM).

Fill – Fill was encountered below the surface materials in borings B-1, B-3, B-7 and B-8. The fill generally consisted of loose to very dense, light brown to dark brown SAND with trace to little non-plastic fines and trace to little gravel (SP, SP-SM, or SM). A 4-inch-thick buried asphalt layer was encountered within the fill in boring B-3 and trace debris (e.g., brick fragments) was encountered in B-1. The fill extended to depths ranging from approximately 2 to 8 feet.

Sand – Native soils encountered below the fill or subsoil generally consisted of medium dense to very dense SAND with trace to some gravel and trace non-plastic fines (SP). Each boring was terminated within the SAND at a depth of approximately 27 feet. Auger grinding was observed during drilling within boring B-7, possibly indicative of cobbles or gravel layers within the sand.

Groundwater – Groundwater was not encountered in the borings. The groundwater monitoring well installed in boring B-7 was observed to be dry at the time of our field explorations.

Groundwater levels should be expected to fluctuate with season, variations in precipitation, construction in the area, and other factors. Perched groundwater conditions could exist close to the ground surface, especially during and after extended periods of wet weather.

Laboratory Testing

Select soil samples obtained during the explorations were submitted for geotechnical laboratory testing to determine particle size distributions (ASTM D6913/D7928) and to confirm field classifications. Laboratory testing was performed by Thielsch Engineering of Cranston, Rhode Island. The laboratory test results are incorporated into our exploration logs and included as ***Attachment C***.

PRELIMINARY GEOTECHNICAL CONSIDERATIONS

General

Based on the subsurface conditions encountered in our explorations, the proposed building additions or new high school building can be supported using conventional shallow spread footings bearing in the native, undisturbed, inorganic native medium dense (or denser) sand soils described herein. Existing topsoil and undocumented fill at the Site should be completely removed from below proposed building foundations and floor slabs to expose suitable native soils and replaced with properly compacted Structural Fill. Deeper fill depths should be anticipated in areas near the existing building and where subsurface utilities and underground features are present. The existing fill may provide adequate support of flexible site improvements such as asphalt pavements provided subgrades are properly prepared and evaluated during construction.

Preliminary geotechnical design and construction recommendations are provided in the following sections. Additional geotechnical explorations, analyses, and recommendations will be required for final design, and will be provided in a design-level geotechnical engineering report.

Shallow Foundations and Floor Slabs

A maximum allowable bearing pressure of 4,000 psf can be used for preliminary design of spread footings bearing on undisturbed, inorganic, medium dense or denser SAND or on properly compacted Structural Fill placed directly above such soils.

Footings should be embedded at least 4 feet below the nearest proposed adjacent ground surface exposed to freezing. For building additions, bearing elevations for new footings should match the existing foundation bearing elevations of the adjacent school building.

Ground level floors can be supported on conventional slabs on-grade once topsoil, existing fill and other unsuitable materials are removed and replaced with Structural Fill. Recommendations for design and construction of foundations and slabs will be provided in our design-level geotechnical report.

Seismic Considerations

Based on the subsurface conditions evaluated to date, seismic site class was determined in accordance with the International Building Code (IBC) as adapted by the Massachusetts State Building Code using a weighted average of SPT blow counts in the upper 100 feet of soil at a site. Based on the soil types and consistencies encountered in our explorations, we currently recommend that structural design of the proposed buildings be evaluated using parameters associated with Site Class D. As part of final design, borings that extend deeper will be performed to confirm this site class.

Excavation Considerations

Excavations will be required for site preparation, grading, foundation construction, utility construction, etc. Temporary excavation support will be required where excavations cannot feasibly be open cut, such as locations adjacent to property lines or structures and utilities, or if groundwater seepage is present.

Groundwater was not encountered within the depths explored in the borings, and we anticipate groundwater will be below the planned excavation depths during construction. However, localized dewatering of some excavations may be required during construction due to infiltrating surface water, or pockets of trapped or perched water.

Fill Materials and Soil Reuse

Well graded sand and gravel fill with less than approximately 10 percent fines (such as MassDOT M1.03.0-type B Gravel Borrow or M2.01.7 Dense-graded Crushed Stone) is recommended for use as Structural Fill in foundation, slab, and other structural areas. On-site materials meeting the gradation requirements for the aforementioned MassDOT materials may be acceptable for use as Structural Fill if approved by the geotechnical engineer. On-site granular soils that are free of organics, contamination (including metals, VOCs, SVOCs, etc.), and other deleterious materials may be suitable for use as fill in areas outside proposed structures (i.e., Common Fill) if properly moisture conditioned.

We anticipate the onsite fill and native sand with up to about 20 percent fines may be suitable for reuse as Common Fill in non-structural areas and below a depth of about 2 feet in proposed pavement areas. Some of the existing soils with trace to few silt may also be suitable for reuse as Structural Fill pending the results of additional laboratory testing.

LIMITATIONS

We have completed this geotechnical feasibility study for use by Tappé Architects, Inc. and their design and construction teams for this site and project only. The information herein may be used for preliminary cost estimating and/or alternative analyses but is not considered sufficient for design or bidding and should not be construed as a warranty of subsurface conditions.

Additional geotechnical explorations and analyses will be required for final design. We have made observations only at the aforementioned locations and only to the stated depths. These observations do not reflect soil types, strata thicknesses, water levels or seepage that may exist between or below preliminary observations. Our recommendations are not applicable to other areas of the site.

If any changes are made to the anticipated locations, loads, grading, configurations, or construction timing, the conclusions and recommendations contained herein may not be applicable, and we should be consulted. Within the limitations of scope, schedule and budget, our services have been executed in accordance with the generally accepted practices in this area at the time this report was prepared. No warranty, expressed or implied, is given. Additional information about interpretation and use of this report is included in ***Attachment D.***

It has been a pleasure assisting you with this project and we look forward to our continued involvement. Please call if you have any questions.

Very truly yours,
WESTON & SAMPSON, INC.

Stefanie Bridges, PE
Geotechnical Project Manager

Stephen Spink, PE
Geotechnical Team Leader

Attachments:
Figures
Attachment A – Conceptual Site Layout Alternatives
Attachment B – Boring Logs
Attachment C – Geotechnical Laboratory Test Data
Attachment D – "Important Information about this Geotechnical Engineering Report" by GBA, Inc..

Figures

Weston & Sampson

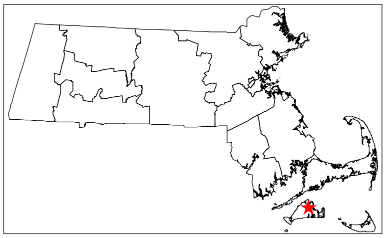
SCALE IN FEET

0 1000 2000

FIGURE 1

LOCUS MAP

MVRHS FEASIBILITY EVALUATION
100 EDGARTOWN VINEYARD
HAVEN ROAD
OAK BLUFFS, MA
DUKES COUNTY



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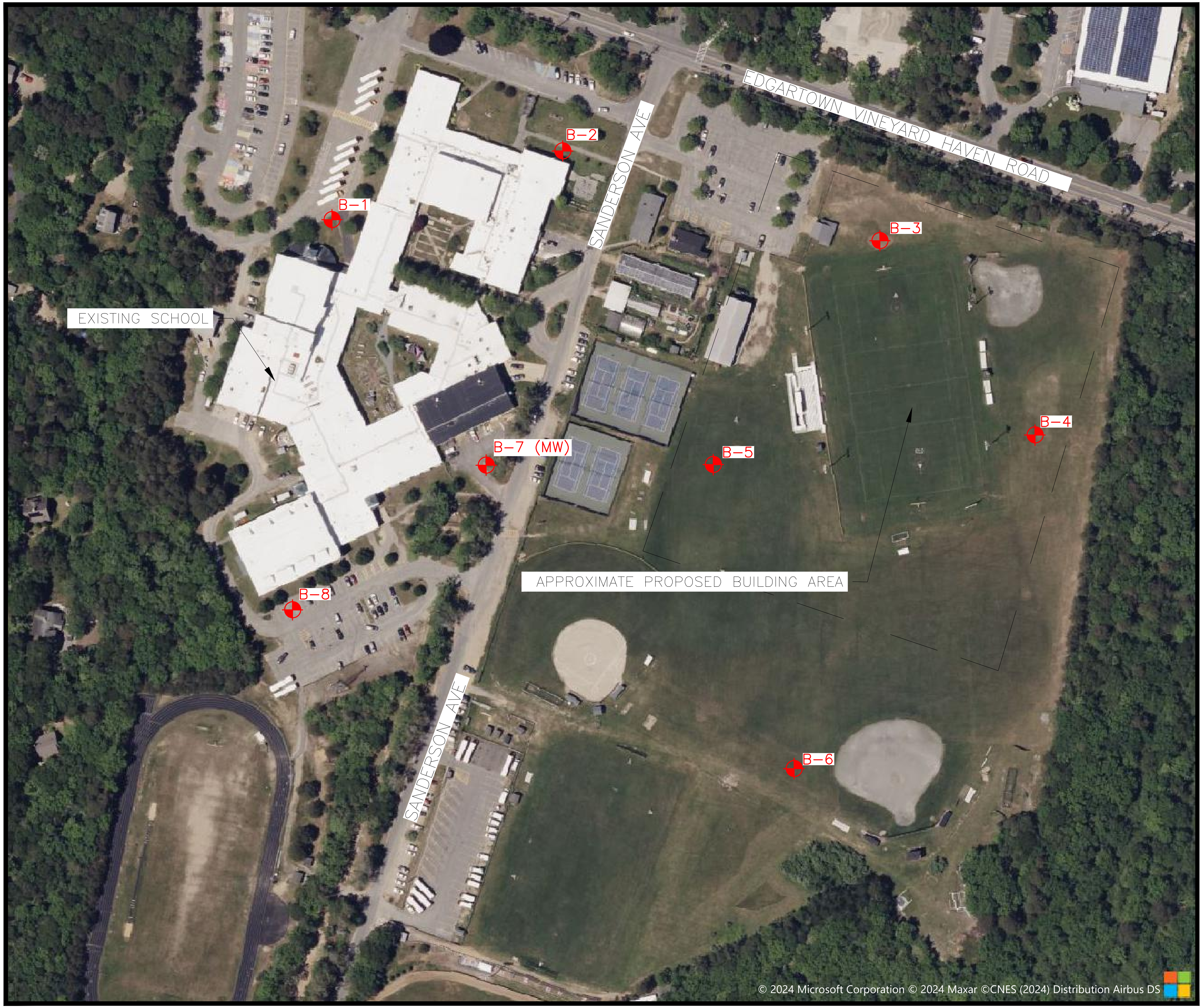
\\wse03.local\WSE\Projects\Private\Tappe Associates\24-0685- Martha's Vineyard Regional High School\07-DesignMaterials\02-Geotechnical\3.1 CADD\MV Regional High School – Proposed Boring Location Plan.dwg



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NOTES

1. THIS PLAN IS BASED ON A CONCEPTUAL SITE PLAN PROVIDED BY WESTON & SAMPSON DATED MAY 2024.
2. BORINGS WERE COMPLETED BY NORTHERN DRILL SERVICE, INC. OF NORTHBOROUGH, MA ON JUNE 26 AND 27, 2024
3. BORINGS WERE OBSERVED BY A WESTON & SAMPSON ENGINEER.
4. BORING LOCATIONS SHOWN ARE APPROXIMATE.

LEGEND

⊕ B-X	DESIGNATION AND APPROXIMATE LOCATION OF BORING
(MW)	INDICATES A GROUNDWATER MONITORING WELL WAS INSTALLED IN THE BORING UPON COMPLETION

GRAPHIC SCALE
150 75 0 150 300
SCALE: 1"=150'

ORIENTATION

TITLE
SITE PLAN

PROJECT
MVRHS FEASIBILITY EVALUATION

100 EDGARTOWN VINEYARD HAVEN ROAD, OAK BLUFFS, MA 02557

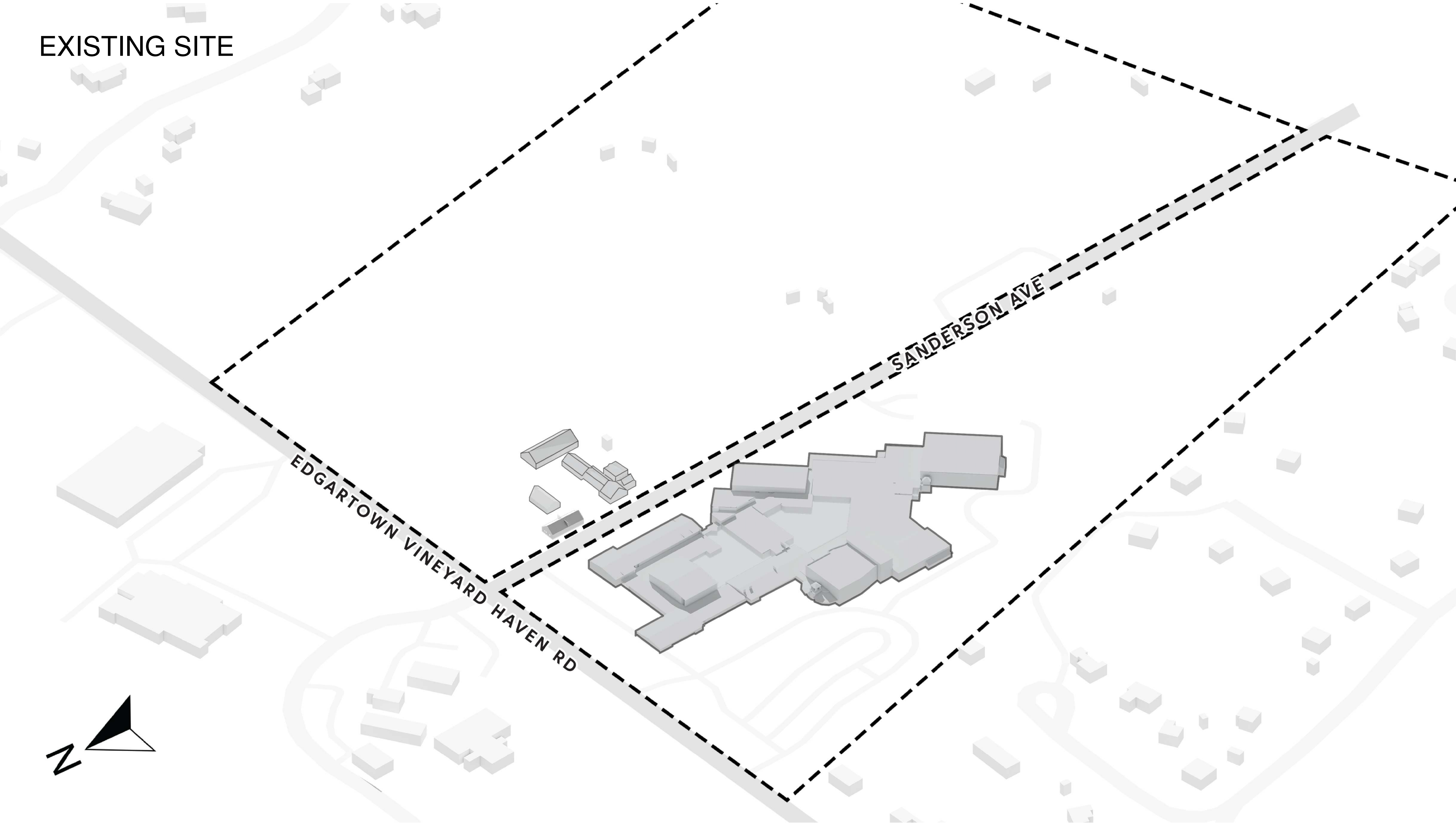
DATE	07/2024
DRWN BY	KEL
CHKD BY	STS
PRJ. NO.	
REV. NO.	-

FIGURE
FIGURE 2

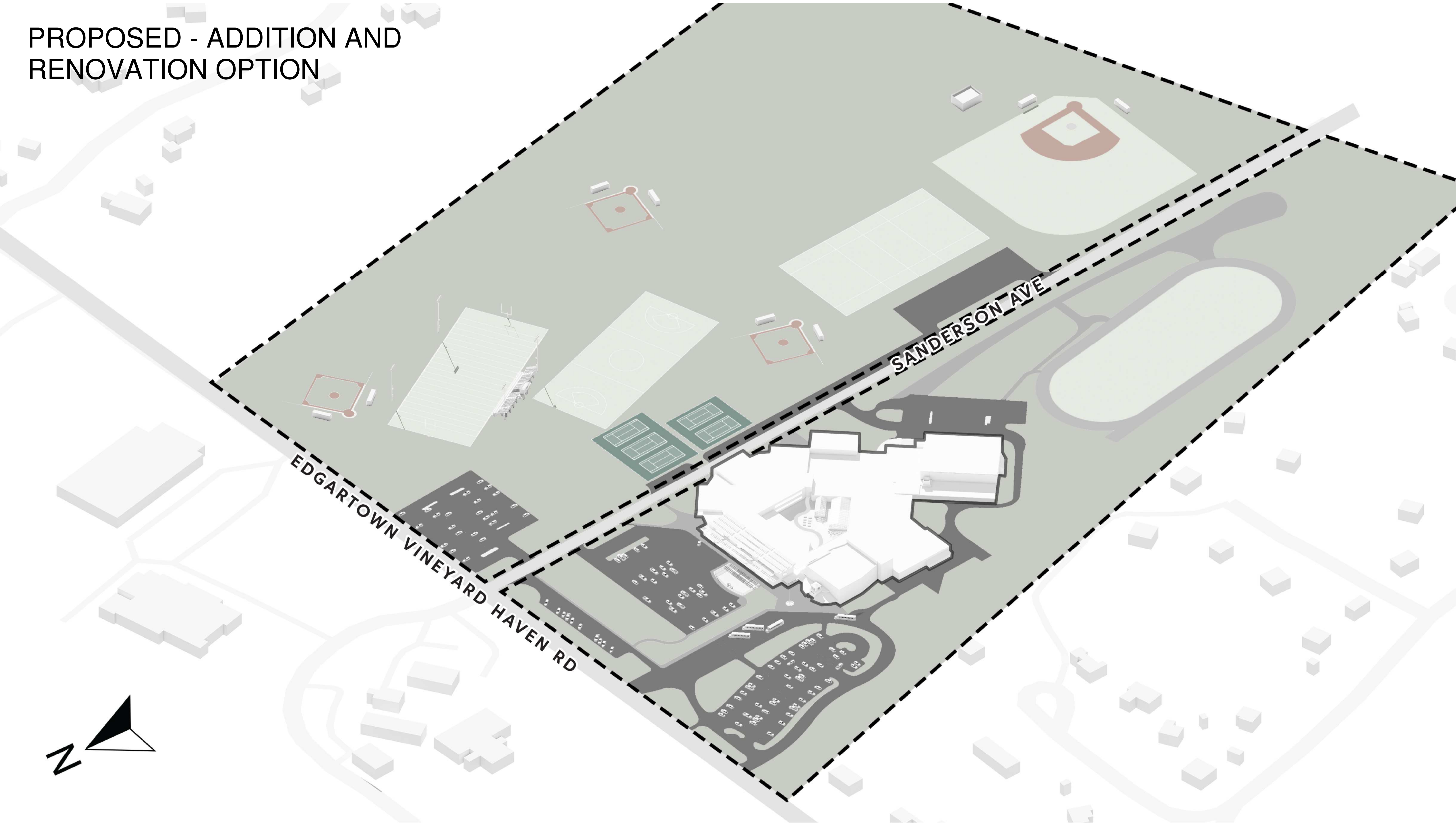
Attachment A

Conceptual Site Layout Alternatives

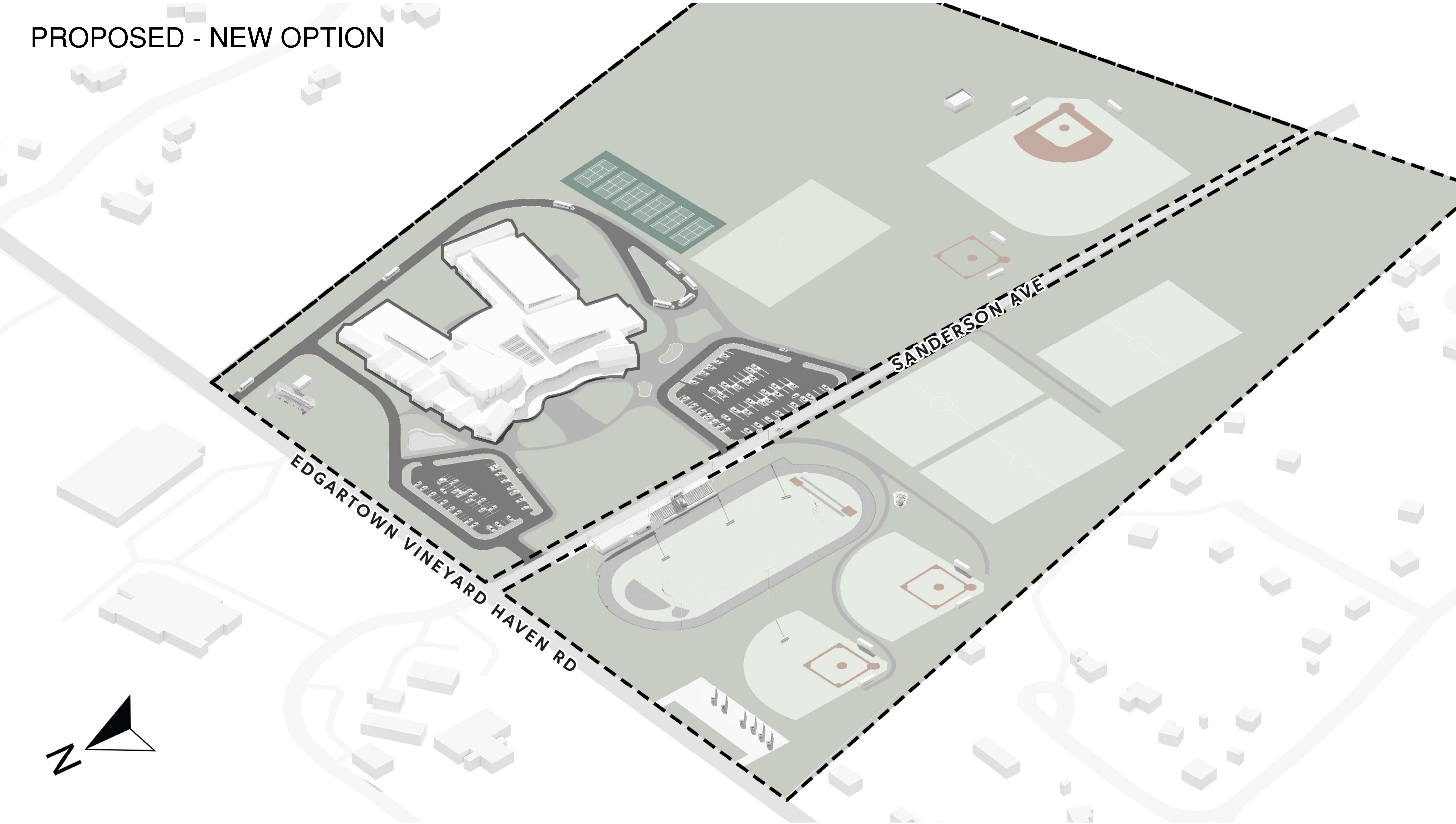
EXISTING SITE



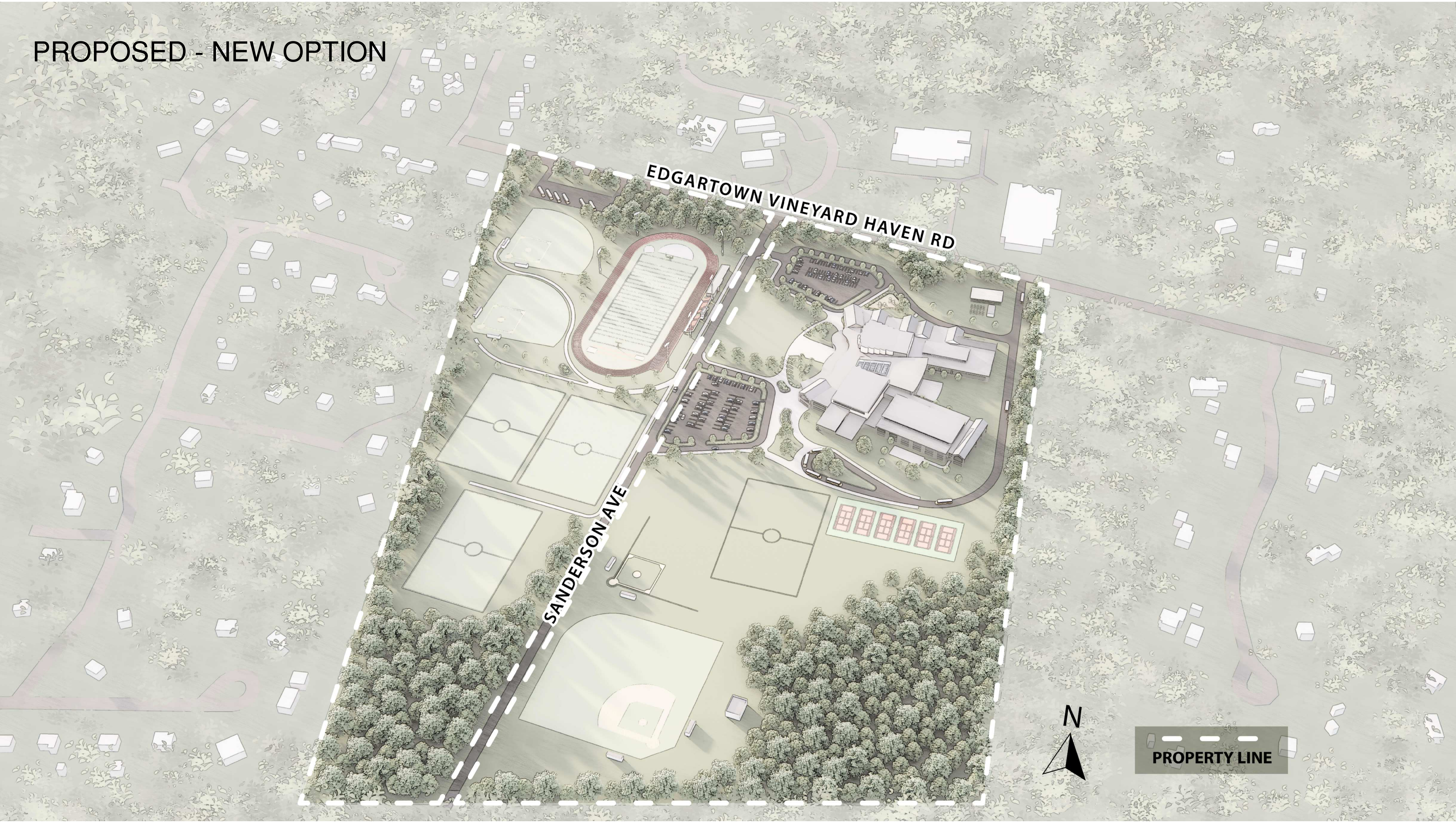
PROPOSED - ADDITION AND RENOVATION OPTION



PROPOSED - NEW OPTION



PROPOSED - NEW OPTION



Attachment B

Boring Logs

GUIDE TO SUBSURFACE EXPLORATION LOGS

Weston & Sampson℠

INDEX SHEET 1
GENERAL INFORMATION

GENERAL NOTES AND USE OF LOGS

1.) Explorations were made by ordinary and conventional methods and with care adequate for Weston & Sampson's study and/or design purposes. The exploration logs are part of a specific report prepared by Weston & Sampson for the referenced project and client, and are an integral part of that report. Information and interpretations are subject to the explanations and limitations stated in the report. Weston & Sampson is not responsible for any interpretations, assumptions, projections, or interpolations made by others.

2.) Exploration logs represent general conditions observed at the point of exploration on the date(s) stated. Boundary lines separating soil and rock layers (strata) represent approximate boundaries only and are shown as solid lines where observed and dashed lines where inferred based on drilling action. Actual transitions may be gradual and changes may occur over time.

3.) Soil and rock descriptions are based on visual-manual examination of recovered samples, direct observation in test pits (when permissible), and laboratory testing (when conducted).

4.) Water level observations were made at the times and under the conditions stated. Fluctuations should be be expected to vary with seasons and other factors. Use of fluids during drilling may affect water level observations. The absence of water level observations does not necessarily mean the exploration was dry or that subsurface water will not be encountered during construction.

5.) Standard split spoon samplers may not recover particles with any dimension larger than 1-3/8 inches. Reported gravel conditions or poor sample recovery may not reflect actual in-situ conditions.

6.) Sections of this guide provide a general overview of Weston & Sampson's practices and procedures for *identifying* and *describing* soil and rock. These procedures are predominantly based on ASTM D2488, *Standard Practice for Description and Identification of Soils (Visual-Manual Procedures)*, the International Society of Rock Mechanics (ISRM) standards, and the *Engineering Geology Field Manual* published by the Bureau of Reclamation. Not all aspects of this guide relating to description and identification procedures of soil and rock may be applicable in all circumstances.

DEFINITIONS OF COMMON TERMS

Sample Recovery Ratio - The length of material recovered in a drive or push type sampler over the length of sampler penetration, in inches (e.g. 18/24).

Standard Penetration Test (*SPT*) - An in-situ test where a standard split-spoon sampler is driven a distance of 12 or 18 inches (after an initial 6-inch seating interval) using a 140-lb. hammer falling 30 inches for each blow.

SPT Blows - The number of hammer blows required to drive a split-spoon sampler each consecutive 6-inch interval during a *Standard Penetration Test*. If no discernable advancement of a split spoon sampler is made after 50 consecutive hammer blows, 50/X indicates *sampler refusal* and is the number of blows required to drive the sampler X inches.

SPT N-Value (*N*) - The uncorrected blow count representation of a soil's penetration resistance over a 12-inch interval after an initial 6-in. seating interval, reported in blows per foot (bpf). The N-value is correlated to soil engineering properties.

Auger Refusal - No discernable advancement of the auger over a period of 5 minutes with full rig down pressure applied.

Casing Refusal (Driven) - Casing penetration of less than 6 inches after a minimum 50 blows of a drop hammer weighing 300 lbs. or a minimum 100 blows of a drop hammer weighing 140 lbs.

PID Measurement - A measurement (electronic reading) taken in the field using a photoionization detector (PID) to detect the presence of volatile organic compounds in a soil sample. Values are reported as benzene equivalent units in parts per million (ppm) unless noted otherwise.

Rock Quality Designation (RQD) - A qualitative index measure of the degree of jointing and fracture of a rock core taken from a borehole. The RQD is defined as the sum length of solid core pieces 4 inches or longer divided by the run (cored) length, expressed as a percentage. Higher RQD values may indicate fewer joints and fractures in the rock mass.

Fill (Made Ground) - A deposit of soil and/or artificial waste materials that has been placed or altered by human processes.

SAMPLER GRAPHICS

◣	Split Spoon (Standard) 2" OD, 1-3/8" ID
⧗	Split Spoon (Oversize) 3" OD, 2-3/8" ID
■	Shelby or Piston Tube 3" OD, 2-7/8" ID
▮	Double-Tube Rock Core Barrel 2" Core Diameter
▮	Direct Push with Acetate Liner Various Liner Sizes
A	Auger Sample *(from cuttings or hand auger)*
G	Grab Sample *(manual, from discrete point)*
C	Composite Sample *(multiple grab samples)*

WELL GRAPHICS

▩	Cement concrete seal around casing or riser pipe
▨	Bentonite seal around casing or riser pipe
▢	Cement grout seal around casing or riser pipe
▩	Soil backfill around riser pipe or beneath screen
▩	Gravel backfill around screen or riser pipe
▩	Sand backfill around screen or riser pipe (filter sand)
▯	Solid-wall riser; Sch. 40 PVC, 1" ID unless noted otherwise
▤	Slotted screen; Sch. 40 PVC, 1" ID with machined slots

CAVING / SEEPAGE TERMS

The following caving and/or seepage terms may appear on a test pit log.

Caving Term	Criteria
Minor	less than 1 cubic ft.
Moderate	1 to 3 cubic ft.
Severe	greater than 3 cubic ft.

Seepage Term	Criteria
Slow	less than 1 gpm
Moderate	1 to 3 gpm
Fast	greater than 3 gpm

KEY TO WATER LEVELS

▼	Observed in exploration during advancement.
▽	Measured in exploration at completion, prior to backfilling or well installation.
⧨	Measured in exploration after the stated stabilization period, prior to backfilling, or in well installation if noted.

LABORATORY TESTS AND FIELD MEASUREMENTS

MC	Moisture Content	IC	1D Incremental Consolidation
OC	Organic Content	VS	Laboratory Vane Shear
PL	Plastic Limit	US	Unconfined Compression
LL	Liquid Limit	TC	Triaxial Compression
GC	Gravel Content	PP	Pocket (Hand) Penetrometer
SC	Sand Content	TV	Torvane (Hand Vane)
FC	Fines Content	PID	Photoionization Detector
DS	Direct Shear	FID	Flame Ionization Detector

BORING ADVANCEMENT METHODS

Hollow-Stem Auger Drilling - Utilizes continuous flight auger sections with hollow stems to advance the borehole. Drill rods and a plug are inserted into the auger stem to prevent the entrance of soil cuttings into the augers.

Rotary Wash Drilling - Utilizes downward pressure and rotary action applied to a non-coring bit while washing the cuttings to the surface using a circulating fluid injected down the drill rods. The borehole is supported with either steel casing or the drilling fluid. Where a casing is used, the borehole is advanced sequentially by driving the casing to the desired depth and then cleaning out the casing. The process of driving and cleaning the casing is commonly referred to as the 'drive-and-wash' technique.

Continuous Sampling - Includes a variety of methods and procedures during which the borehole is advanced via continuous recovery of soil samples. *Direct Push* sampling is a common method that uses static downward pressure combined with percussive energy to drive a steel mandrel into the ground at continuous intervals while recovering soil samples in disposable acetate liners.

Rock Coring - Utilizes downward pressure and rotary action applied to a core barrel equipped with a diamond-set or tungsten carbide coring bit. During conventional coring, the entire barrel is retrieved from the hole upon completion of a core run. Wireline coring allows for removal of the inner barrel assembly containing the actual core while the the drill rods and outer barrel remain in the hole. Various types and sizes of core barrels and bits are used.

GUIDE TO SUBSURFACE EXPLORATION LOGS

Weston & Sampson℠

INDEX SHEET 2
SOIL DESCRIPTION

SOIL CONSTITUENTS

Naturally occurring soils consist of one or more of the following matrix constituents defined in terms of particle size.

Constituent		**U.S. Sieve Size**			**Observed Size (in.)**		
Gravel	(Coarse)	3/4 in.	-	3 in.	3/4	-	3
Gravel	(Fine)	No. 4	-	3/4 in.	1/5	-	3/4
Sand	(Coarse)	No. 10	-	No. 40	1/16	-	1/5
Sand	(Medium)	No. 40	-	No. 10	1/64	-	1/16
Sand	(Fine)	No. 200	-	No. 40	1/300	-	1/64
Fines	(Silt or Clay)	Smaller than		No. 200	Less than		1/300

SOIL IDENTIFICATION

Soil identification refers to the grouping of soils with similar physical characteristics into a category defined by a **group name** and corresponding **group symbol** based on estimation of the matrix soil constituents to the nearest 5% and simple manual tests. Proportions of cobbles, boulders, and other non-matrix soil materials are not considered during this procedure but are included in the overall soil description if observed or thought to be present. Refer to the following descriptions and tables adapted from ASTM D2488.

Coarse-Grained Soil - Coarse-grained soils contain fewer than 50% fines and are identified based on the following table.

Primary Constituent	Fines Percent	Type of Fines and Gradation		Group Symbol	Group Name (1)
GRAVEL *% gravel* > *% sand*	≤ 5%	well graded		GW	Well graded gravel
		poorly graded		GP	Poorly graded gravel
	10%	clayey fines	well graded	GW-GC	Well graded gravel with clay
			poorly graded	GP-GC	Poorly graded gravel with clay
		silty fines	well graded	GW-GM	Well graded gravel wth silt
			poorly graded	GP-GM	Poorly graded gravel with silt
	15% to 45%	clay fines		GC	Clayey gravel
		silt fines		GM	Silty gravel
SAND *% sand* ≥ *% gravel*	≤ 5%	well graded		SW	Well graded sand
		poorly graded		SP	Poorly graded sand
	10%	clayey fines	well graded	SW-SC	Well graded sand with clay
			poorly graded	SP-SC	Poorly graded sand with clay
		silty fines	well graded	SW-SM	Well graded sand with silt
			poorly graded	SP-SM	Poorly graded sand with silt
	15% to 45%	clay fines		SC	Clayey sand
		silt fines		SM	Silty sand

(1) If soil is a gravel and contains 15% or more sand, add "with sand" to the group name. If soil is a sand and contains 15% of more gravel, add "with gravel" to the group name.

Inorganic Fine-Grained Soil - Fine-grained soils contain 50% or more fines and are identified based on the following table.

Plasticity Criteria	Dry Strength	Coarse Fraction S = Sand, G = Gravel		Group Symbol	Group Name (1)
Medium	Medium to high	< 15% S + G		CL	Lean clay
		≥ 30% S + G	% S ≥ % G	CL	Sandy lean clay
			% S < % G	CL	Gravelly lean clay
Non-plastic	None to low	< 15% S + G		ML	Silt
		≥ 30% S + G	% S ≥ % G	ML	Sandy silt
			% S < % G	ML	Gravelly silt
High	High to very high	< 15% S + G		CH	Fat clay
		≥ 30% S + G	% S ≥ % G	CH	Sandy fat clay
			% S < % G	CH	Gravelly fat clay
Low to Medium	Low to medium	< 15% S + G		MH	Elastic silt
		≥ 30% S + G	% S ≥ % G	MH	Sandy elastic silt
			% S < % G	MH	Gravelly elastic silt

(1) If soil contains 15% to 25% sand or gravel, add "with sand" or "with gravel" to the group name.

Organic Fine-Grained Soil - Fine-grained soils that contain enough organic particles to influence the soil properties are identified as Organic Soil and assigned the group symbol **OL** or **OH**.

Highly Organic Soil (Peat) - Soils composed primarily of plant remains in various stages of decomposition are identified as Peat and given the group symbol **PT**. Peat usually has an organic odor, a dark brown to black color, and a texture ranging from fibrous (original plant structure intact or mostly intact) to amorphous (plant structure decomposed to fine particles).

SOIL DESCRIPTION

Soils are *described* in the following general sequence. Deviations may occur in some instances.

Identification Components

(1) Group Name and Group Symbol

Description Components

(2) Consistency (Fine-Grained) or Apparent Density (Coarse-Grained)
(3) Color (*note, the term "to" may be used to indicate a gradational change*)
(4) Soil Moisture
(5) Matrix Soil Constituents (Gravel, Sand, Fines)
    └➝ Proportion (*by weight*), particle size, plasticity of fines, angularity, etc.
(6) Non-Matrix Soil Materials and Proportions (*by volume*)
(7) Other Descriptive Information (Unusual Odor, Structure, Texture, etc.)
(8) [Geologic Formation Name or Soil Survey Unit]

SPT N-VALUE CORRELATIONS

Consistency	**SPT N-Value**	**Apparent Density**	**SPT N-Value**
Very soft	0 - 2	Very loose	0 - 5
Soft	2 - 4	Loose	5 - 10
Medium stiff	4 - 8	Medium dense	10 - 30
Stiff	8 - 15	Dense	30 - 50
Very stiff	15 - 30	Very dense	> 50
Hard	> 30		

SOIL MOISTURE

Dry	Apparent absence of moisture; dry to the touch.
Moist	Damp but no visible water.
Wet	Visible free water; saturated.

PROPORTIONS / PERCENTAGES

Proportions of gravel, sand, and fines (excluding cobbles, boulders, and other constituents) are stated in the following terms indicating a range of percentages by weight (to nearest 5%) of the minus 3-in. soil fraction and add up to 100%.

Mostly	50% - 100%
Some	30% - 45%
Little	15% - 25%
Few	5% - 10%
Trace	Less than 5%

Proportions of cobbles, boulders, and other non-matrix soil materials including artificial debris, roots, plant fibers, etc. are stated in the following terms indicating a range of percentages by volume (to the nearest 5%) of the total soil.

Numerous	40% - 50%
Common	25% - 35%
Occasional	10% - 20%
Trace	Less than 5%

PLASTICITY (FINES ONLY)

Non-plastic	Dry specimen ball falls apart easily. Cannot be rolled into thread at any moisture content.
Low	Dry specimen ball easily crushed with fingers. Can be rolled into 1/8-in. thread with some difficulty.
Medium	Difficult to crush dry specimen ball with fingers. Easily rolled into 1/8-in. thread.
High	Cannot crush dry specimen ball with fingers. Easily rolled and re-rolled into 1/8-in. thread.

COBBLES AND BOULDERS

Cobbles - Particles of rock that will pass a 12-in. square opening and be retained on a 3-in. sieve.

Boulders - Particles of rock that will not pass a 12-in. square opening.

Note: Where the percentage (by volume) of cobbles and/or boulders cannot be accurately or reliably estimated, the terms "with cobbles", "with boulders", or "with cobbles and boulders" may be used to indicate observed or inferred presence.

Weston & Sampson℠

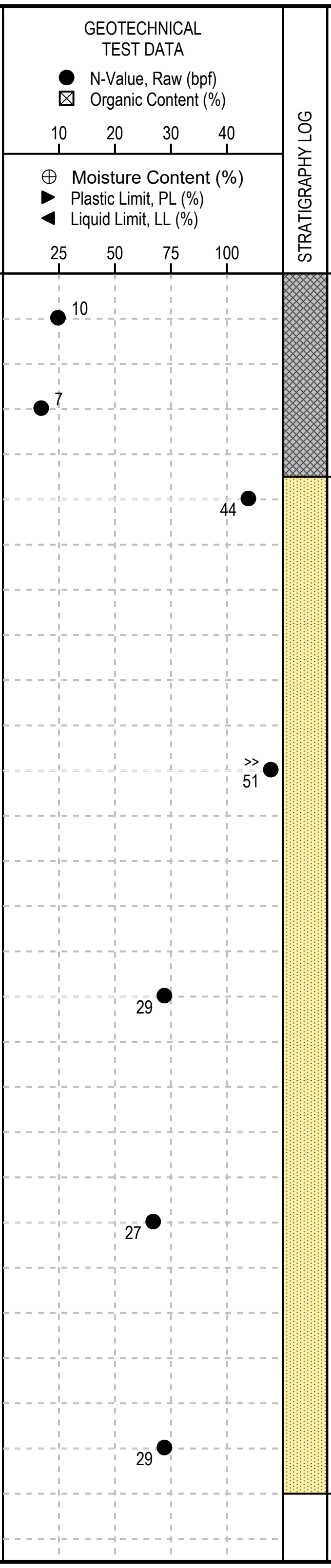
MVRHS Feasibility Evaluation
100 Edgartown Vineyard Haven Rd, Oak Bluffs, MA

BORING ID: B-1

WSE Project: ENG24-0685

Page 1 of 1

CONTRACTOR:	**Northern Drill Service, Inc.**	BORING LOCATION:	**See Attached Figure**	DATE START:	**June 26, 2024**
FOREMAN:	**Tim Tucker**	ADVANCE METHOD:	**Hollow-Stem Auger Drilling**	DATE FINISH:	**June 26, 2024**
LOGGED BY:	**Kathryn Lennon**	AUGER DIAMETER:	**4-1/4" ID (Stem), 7-5/8" OD (Flights)**	GROUND EL:	**82.0 ± (NAVD88)**
CHECKED BY:	**Aaron Chabot, EIT**	SUPPORT CASING:	**N/A**	FINAL DEPTH:	**27.0 ft.**
EQUIPMENT:	**Mobile B-53, ATV Mounted**	CORING METHOD:	**N/A**	GRID COORDS:	**N:152386.7586 / E:1613994.2370**
SPT HAMMER:	**Automatic (140-lb.)**	BACKFILL MATERIAL:	**Drill Cuttings**	GRID SYSTEM:	**NAD83 State Plane (MA)**



DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE ID NUMBER AND RECOVERY RATIO [IN./IN.]	SPT BLOWS / 6 IN. (OR) CORE RATE / 12 IN. [MIN.]	PID MEASUREMENT, PPM BY VOLUME (HEADSPACE)	N-Value, Raw (bpf)	STRATUM IDENTIFICATION AND DESCRIPTION	ELEVATION SCALE SHOWN TO NEAREST FT.	REMARKS, OTHER TESTS, AND INSTALLATIONS
					Surface: Grass area.		Note: Values in brackets preceeding a remark indicate depth below ground surface (in feet) corresponding to the remark.
	S-1 15/24	4 5 5 4	0.0	10	**Poorly graded sand with silt (SP-SM)** - Medium dense; brown; moist; mostly fine to medium SAND, few non plastic fines, trace fine gravel. **[FILL]**		
	S-2 14/24	4 3 4 5	0.2	7	**Silty sand (SM)** - Loose; light brown; moist; mostly fine to medium SAND, little non plastic fines, trace fine gravel. **[FILL]**		[3.0] GC: 2%, SC: 73%, FC: 25%
					Trace brick debris		
5	S-3 18/24	13 18 26 34	1.1	44	**Poorly graded sand (SP)** - Medium dense to very dense; brown; moist; mostly fine to coarse SAND, trace non plastic fines.	77	
10	S-4 3/24	12 21 30 24	0.7	>> 51	*Change to few fine to coarse gravel*	72	
15	S-5 13/24	4 14 15 16		29	*[16.6'] 1-inch thick seam of grey silt*	67	
20	S-6 12/24	13 14 13 14		27		62	
25	S-7 16/24	9 18 11 11		29	*Change to fine to medium sand*	57	
							Exploration ended at 27.0 ft.

Refer to the attached index sheets for important information about this log including general notes, legends, and guidance on description methods and procedures.

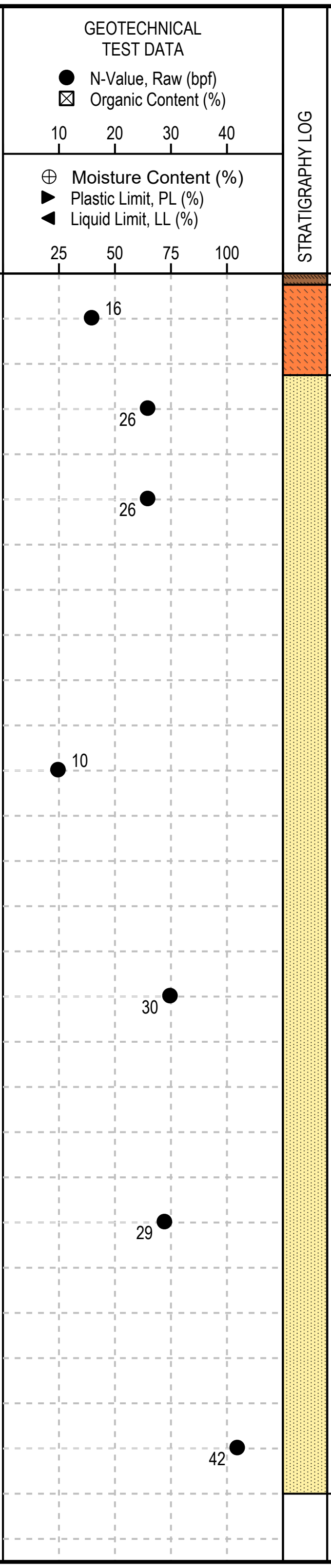
Weston & Sampson

WSE Project: ENG24-0685

MVRHS Feasibility Evaluation
100 Edgartown Vineyard Haven Rd, Oak Bluffs, MA

BORING ID: B-2

CONTRACTOR:	**Northern Drill Service, Inc.**	BORING LOCATION:	**See Attached Figure**	DATE START:	**June 26, 2024**
FOREMAN:	**Tim Tucker**	ADVANCE METHOD:	**Hollow-Stem Auger Drilling**	DATE FINISH:	**June 26, 2024**
LOGGED BY:	**Kathryn Lennon**	AUGER DIAMETER:	**4-1/4" ID (Stem), 7-5/8" OD (Flights)**	GROUND EL:	**82.0 ± (NAVD88)**
CHECKED BY:	**Aaron Chabot, EIT**	SUPPORT CASING:	**N/A**	FINAL DEPTH:	**27.0 ft.**
EQUIPMENT:	**Mobile B-53, ATV Mounted**	CORING METHOD:	**N/A**	GRID COORDS:	**N:152484.0973 / E:1614339.6228**
SPT HAMMER:	**Automatic (140-lb.)**	BACKFILL MATERIAL:	**Drill Cuttings**	GRID SYSTEM:	**NAD83 State Plane (MA)**



DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE ID NUMBER AND RECOVERY RATIO [IN./IN.]	SPT BLOWS / 6 IN. (OR) CORE RATE / 12 IN. [MIN.]	PID MEASUREMENT, PPM BY VOLUME (HEADSPACE)	STRATUM IDENTIFICATION AND DESCRIPTION	ELEVATION SCALE SHOWN TO NEAREST FT.	REMARKS, OTHER TESTS, AND INSTALLATIONS
				Surface: Grass area.		Note: Values in brackets preceeding a remark indicate depth below ground surface (in feet) corresponding to the remark.
	S-1 14/24	3 9 7 7	0.0	Topsoil- 3 inches thick. **Silty sand (SM)** - Medium dense; light brown; moist; mostly fine to medium SAND, little non plastic fines; trace roots. **[SUBSOIL]**		
	S-2 16/24	9 13 13 12	0.0	**Poorly graded sand (SP)** - Medium dense to dense; orange to tan; moist; mostly fine to medium SAND, trace fine gravel.		
5	S-3 12/24	5 11 15 17	0.1	*Change to few fine gravel, trace non plastic fines.*	77	[5.0] GC: 7%, SC: 90%, FC: 3%
10	S-4 13/24	3 5 5 5	0.4		72	
15	S-5 14/24	11 14 16 18		*Change to fine to medium sand and trace fine gravel*	67	
20	S-6 16/24	9 15 14 20		*Change to few gravel*	62	
25	S-7 13/24	11 17 25 27			57	
						Exploration ended at 27.0 ft.

Refer to the attached index sheets for important information about this log including general notes, legends, and guidance on description methods and procedures.

Weston & Sampson

WSE Project: ENG24-0685

MVRHS Feasibility Evaluation
100 Edgartown Vineyard Haven Rd, Oak Bluffs, MA

BORING ID: B-3

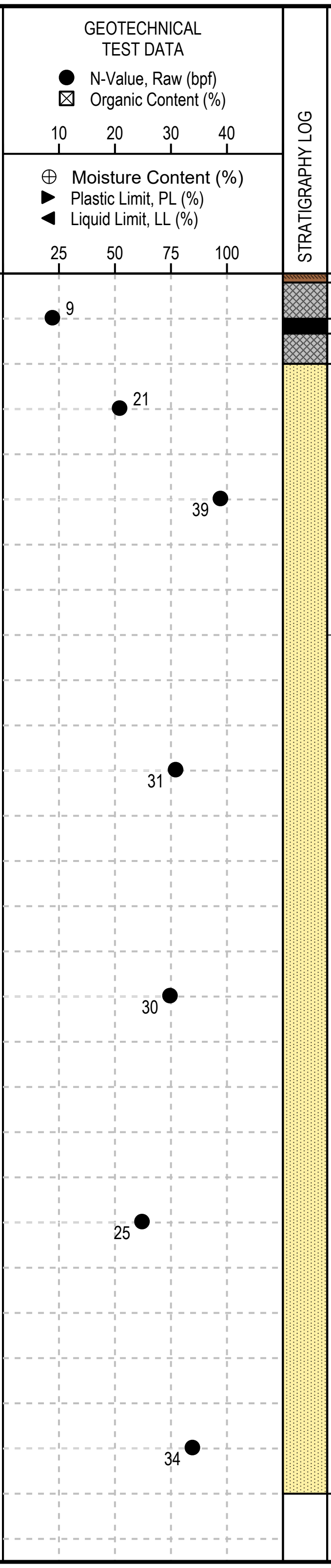
Page 1 of 1

CONTRACTOR:	**Northern Drill Service, Inc.**	BORING LOCATION:	**See Attached Figure**	DATE START:	**June 27, 2024**
FOREMAN:	**Tim Tucker**	ADVANCE METHOD:	**Hollow-Stem Auger Drilling**	DATE FINISH:	**June 27, 2024**
LOGGED BY:	**Kathryn Lennon**	AUGER DIAMETER:	**4-1/4" ID (Stem), 7-5/8" OD (Flights)**	GROUND EL:	**85.3 ± (NAVD88)**
CHECKED BY:	**Aaron Chabot, EIT**	SUPPORT CASING:	**N/A**	FINAL DEPTH:	**27.0 ft.**
EQUIPMENT:	**Mobile B-53, ATV Mounted**	CORING METHOD:	**N/A**	GRID COORDS:	**N:152340.9004 / E:1614823.0534**
SPT HAMMER:	**Automatic (140-lb.)**	BACKFILL MATERIAL:	**Drill Cuttings**	GRID SYSTEM:	**NAD83 State Plane (MA)**

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]: 5, 10, 15, 20, 25

SAMPLE TYPE GRAPHIC

SAMPLE ID NUMBER AND RECOVERY RATIO [IN./IN.]	SPT BLOWS / 6 IN. (OR) CORE RATE / 12 IN. [MIN.]	PID MEASUREMENT, PPM BY VOLUME (HEADSPACE)	N-Value, Raw (bpf)
S-1 12/24	6 7 2 2	0.0	9
S-2 14/24	4 7 14 16	0.4	21
S-3 12/24	8 18 21 24	0.3	39
S-4 11/24	12 16 15 12	0.2	31
S-5 11/24	12 13 17 17		30
S-6 18/24	10 10 15 16		25
S-7 15/24	16 15 19 19		34



STRATUM IDENTIFICATION AND DESCRIPTION

Surface: Grass field.

Topsoil- 2 inches thick.

Silty sand (SM) - Loose; brown; moist; mostly fine to medium SAND, little non plastic fines. **[FILL]**

Asphalt- 4 inches thick.

Poorly graded sand (SP) - Loose; light brown; moist; mostly fine to medium SAND, trace non plastic fines. **[FILL]**

Poorly graded sand with gravel (SP) - Medium dense to dense; orange; moist; mostly fine to coarse SAND, little fine to coarse gravel.

Poorly graded sand (SP) - Medium dense to dense; tan; moist; mostly fine to medium SAND, trace fine to coarse gravel, trace non plastic fines.

ELEVATION SCALE SHOWN TO NEAREST FT.: 81, 76, 71, 66, 61

REMARKS, OTHER TESTS, AND INSTALLATIONS

Note: Values in brackets preceeding a remark indicate depth below ground surface (in feet) corresponding to the remark.

Exploration ended at 27.0 ft.

Refer to the attached index sheets for important information about this log including general notes, legends, and guidance on description methods and procedures.

Weston & Sampson℠

WSE Project: ENG24-0685

MVRHS Feasibility Evaluation
100 Edgartown Vineyard Haven Rd, Oak Bluffs, MA

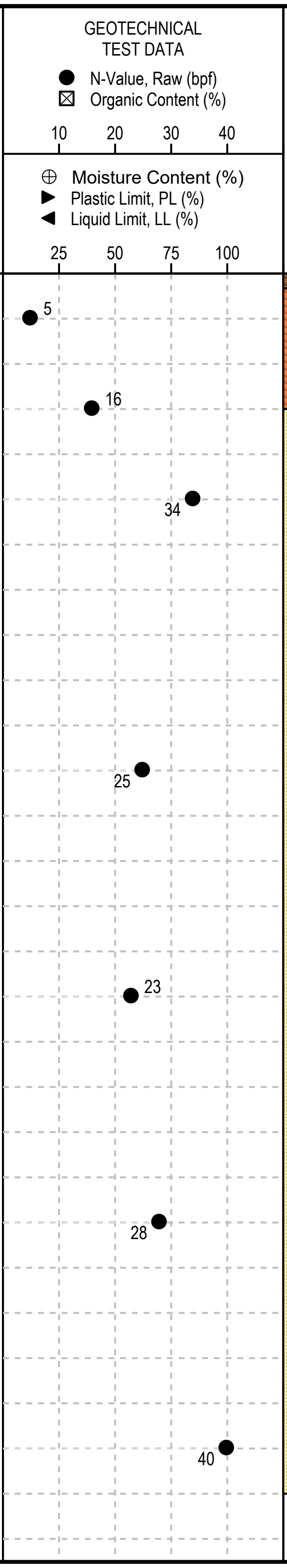
BORING ID: B-4

Page 1 of 1

CONTRACTOR:	**Northern Drill Service, Inc.**	BORING LOCATION:	**See Attached Figure**	DATE START:	**June 27, 2024**
FOREMAN:	**Tim Tucker**	ADVANCE METHOD:	**Hollow-Stem Auger Drilling**	DATE FINISH:	**June 27, 2024**
LOGGED BY:	**Kathryn Lennon**	AUGER DIAMETER:	**4-1/4" ID (Stem), 7-5/8" OD (Flights)**	GROUND EL:	**85.3 ± (NAVD88)**
CHECKED BY:	**Aaron Chabot, EIT**	SUPPORT CASING:	**N/A**	FINAL DEPTH:	**27.0 ft.**
EQUIPMENT:	**Mobile B-53, ATV Mounted**	CORING METHOD:	**N/A**	GRID COORDS:	**N:152079.2798 / E:1615025.3315**
SPT HAMMER:	**Automatic (140-lb.)**	BACKFILL MATERIAL:	**Drill Cuttings**	GRID SYSTEM:	**NAD83 State Plane (MA)**

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE ID NUMBER AND RECOVERY RATIO [IN./IN.]	SPT BLOWS / 6 IN. (OR) CORE RATE / 12 IN. [MIN.]	PID MEASUREMENT, PPM BY VOLUME (HEADSPACE)	N-Value, Raw (bpf)	ELEVATION SCALE SHOWN TO NEAREST FT.
	S-1 12/24	1 3 2 2	0.0	5	
	S-2 15/24	4 7 9 13	0.0	16	
5	S-3 17/24	10 16 18 26	0.4	34	81
10	S-4 14/24	9 12 13 14	0.1	25	76
15	S-5 15/24	8 10 13 15		23	71
20	S-6 15/24	14 14 14 19		28	66
25	S-7 13/24	14 17 23 22		40	61

GEOTECHNICAL TEST DATA



STRATUM IDENTIFICATION AND DESCRIPTION

Surface: Grass field.

Topsoil- 4 inches thick.

Silty sand with gravel (SM) - Loose to medium dense; light brown; moist; mostly fine to medium SAND, little fine to coarse gravel, little non plastic fines. **[SUBSOIL]**

Poorly graded sand (SP) - Medium dense to dense; light brown; moist; mostly fine to medium SAND, trace fine to coarse gravel, trace non plastic fines.

Change to few gravel

Change to no gravel

Change to trace gravel

REMARKS, OTHER TESTS, AND INSTALLATIONS

Note: Values in brackets preceeding a remark indicate depth below ground surface (in feet) corresponding to the remark.

Exploration ended at 27.0 ft.

Refer to the attached index sheets for important information about this log including general notes, legends, and guidance on description methods and procedures.

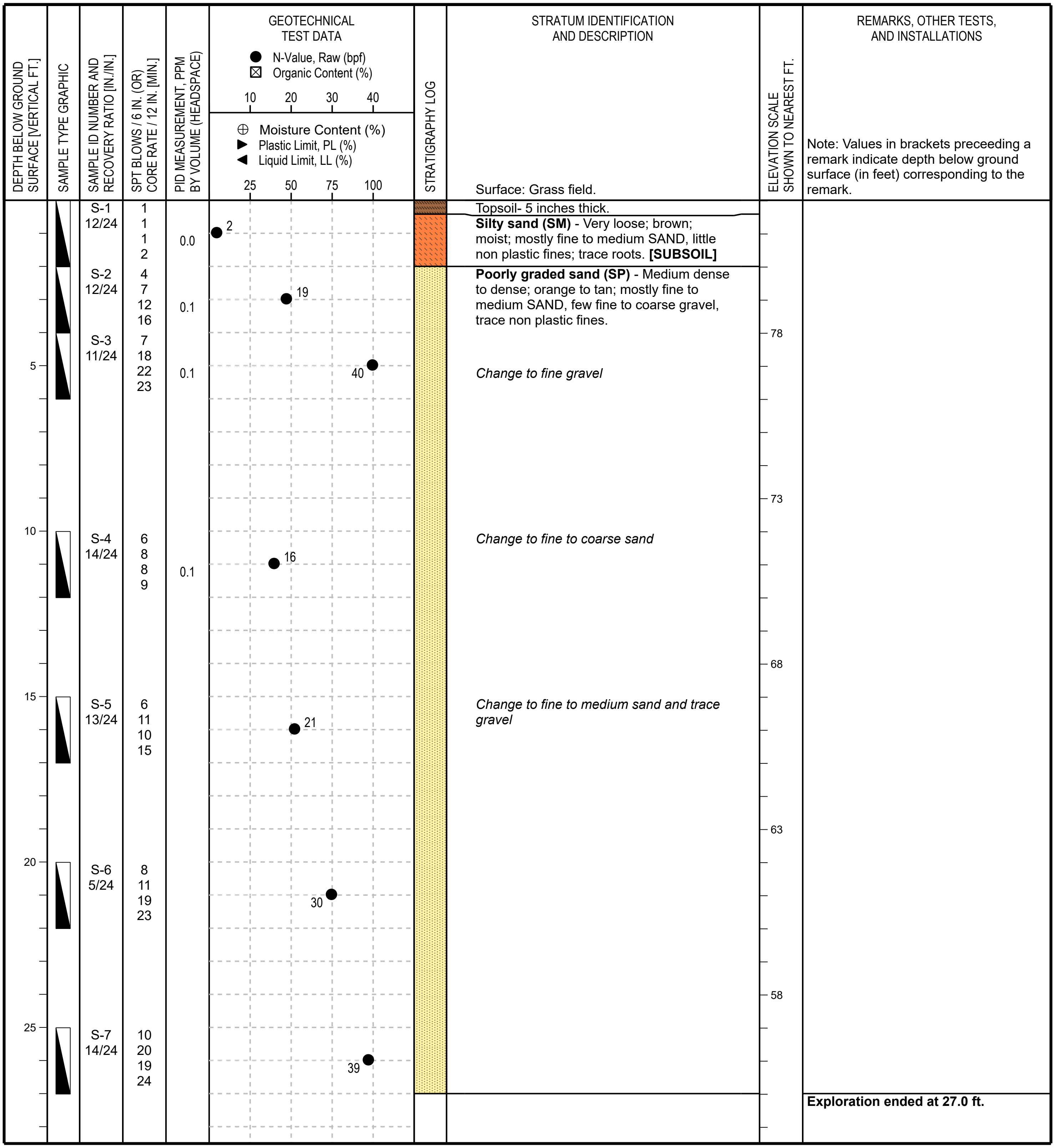
Weston & Sampson

MVRHS Feasibility Evaluation
100 Edgartown Vineyard Haven Rd, Oak Bluffs, MA

BORING ID: B-5

WSE Project: ENG24-0685

CONTRACTOR:	**Northern Drill Service, Inc.**	BORING LOCATION:	**See Attached Figure**	DATE START:	**June 27, 2024**
FOREMAN:	**Tim Tucker**	ADVANCE METHOD:	**Hollow-Stem Auger Drilling**	DATE FINISH:	**June 27, 2024**
LOGGED BY:	**Kathryn Lennon**	AUGER DIAMETER:	**4-1/4" ID (Stem), 7-5/8" OD (Flights)**	GROUND EL:	**82.0 ± (NAVD88)**
CHECKED BY:	**Aaron Chabot, EIT**	SUPPORT CASING:	**N/A**	FINAL DEPTH:	**27.0 ft.**
EQUIPMENT:	**Mobile B-53, ATV Mounted**	CORING METHOD:	**N/A**	GRID COORDS:	**N:151999.6269 / E:1614580.8887**
SPT HAMMER:	**Automatic (140-lb.)**	BACKFILL MATERIAL:	**Drill Cuttings**	GRID SYSTEM:	**NAD83 State Plane (MA)**



Sample ID / Recovery	SPT Blows / 6 in.	PID (ppm)	N-Value
S-1 12/24	1 1 1 2	0.0	2
S-2 12/24	4 7 12 16	0.1	19
S-3 11/24	7 18 22 23	0.1	40
S-4 14/24	6 8 8 9	0.1	16
S-5 13/24	6 11 10 15		21
S-6 5/24	8 11 19 23		30
S-7 14/24	10 20 19 24		39

Note: Values in brackets preceeding a remark indicate depth below ground surface (in feet) corresponding to the remark.

Surface: Grass field.

Topsoil- 5 inches thick.

Silty sand (SM) - Very loose; brown; moist; mostly fine to medium SAND, little non plastic fines; trace roots. **[SUBSOIL]**

Poorly graded sand (SP) - Medium dense to dense; orange to tan; mostly fine to medium SAND, few fine to coarse gravel, trace non plastic fines.

Change to fine gravel

Change to fine to coarse sand

Change to fine to medium sand and trace gravel

Exploration ended at 27.0 ft.

Refer to the attached index sheets for important information about this log including general notes, legends, and guidance on description methods and procedures.

Weston & Sampson℠

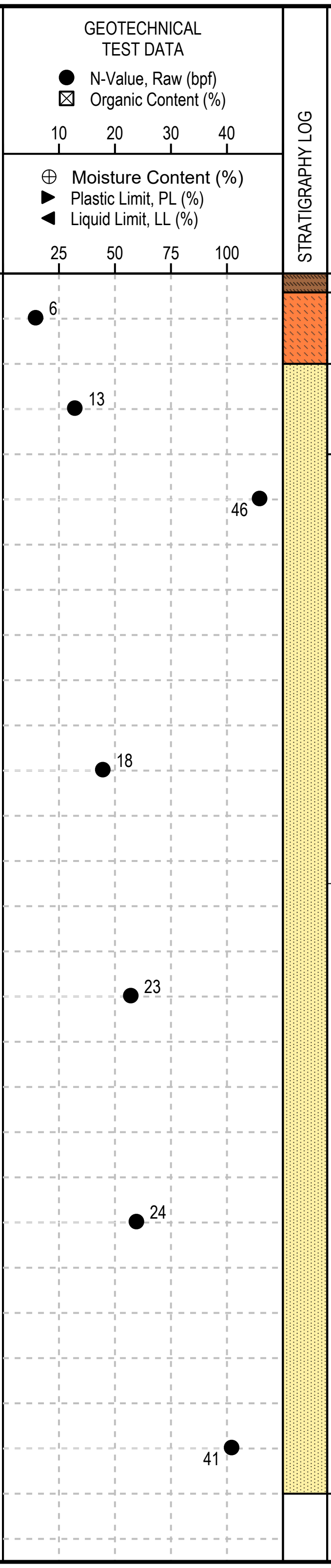
WSE Project: ENG24-0685

MVRHS Feasibility Evaluation
100 Edgartown Vineyard Haven Rd, Oak Bluffs, MA

BORING ID: B-6

Page 1 of 1

CONTRACTOR:	**Northern Drill Service, Inc.**	BORING LOCATION:	**See Attached Figure**	DATE START:	**June 27, 2024**
FOREMAN:	**Tim Tucker**	ADVANCE METHOD:	**Hollow-Stem Auger Drilling**	DATE FINISH:	**June 27, 2024**
LOGGED BY:	**Kathryn Lennon**	AUGER DIAMETER:	**4-1/4" ID (Stem), 7-5/8" OD (Flights)**	GROUND EL:	**82.0 ± (NAVD88)**
CHECKED BY:	**Aaron Chabot, EIT**	SUPPORT CASING:	**N/A**	FINAL DEPTH:	**27.0 ft.**
EQUIPMENT:	**Mobile B-53, ATV Mounted**	CORING METHOD:	**N/A**	GRID COORDS:	**N:151527.5279 / E:1614671.1127**
SPT HAMMER:	**Automatic (140-lb.)**	BACKFILL MATERIAL:	**Drill Cuttings**	GRID SYSTEM:	**NAD83 State Plane (MA)**



DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO [IN./IN.]	SPT BLOWS / 6 IN. (OR) CORE RATE / 12 IN. [MIN.]	PID MEASUREMENT, PPM BY VOLUME (HEADSPACE)	GEOTECHNICAL TEST DATA	ELEVATION SCALE SHOWN TO NEAREST FT.
		S-1 14/24	1 4 2 2	0.0	6	
		S-2 13/24	4 6 7 10	0.1	13	
5		S-3 12/24	7 18 28 19	0.1	46	77
10		S-4 12/24	10 10 8 6	0.4	18	72
15		S-5 11/24	11 13 10 10		23	67
20		S-6 14/24	9 12 12 13		24	62
25		S-7 6/24	12 20 21 23		41	57

STRATUM IDENTIFICATION AND DESCRIPTION

Surface: Grass field.

Topsoil- 5 inches thick.

Silty sand (SM) - Loose; light brown; mostly fine to medium SAND, little non plastic fines, few fine gravel. **[SUBSOIL]**

Poorly graded sand (SP) - Medium dense to dense; light brown; moist; mostly fine to medium SAND, trace fine gravel, trace non plastic fines.

Poorly graded sand with gravel (SP) - Medium dense to dense; light brown; moist; mostly fine to coarse SAND, some fine to coarse gravel, trace non plastic fines.

Poorly graded sand (SP) - Medium dense to dense; light brown; moist; mostly fine to medium SAND, few fine gravel, trace non plastic fines.

Change to fine to medium sand

Change to trace gravel

Change to fine to coarse sand

Change to some gravel

REMARKS, OTHER TESTS, AND INSTALLATIONS

Note: Values in brackets preceeding a remark indicate depth below ground surface (in feet) corresponding to the remark.

Exploration ended at 27.0 ft.

Refer to the attached index sheets for important information about this log including general notes, legends, and guidance on description methods and procedures.

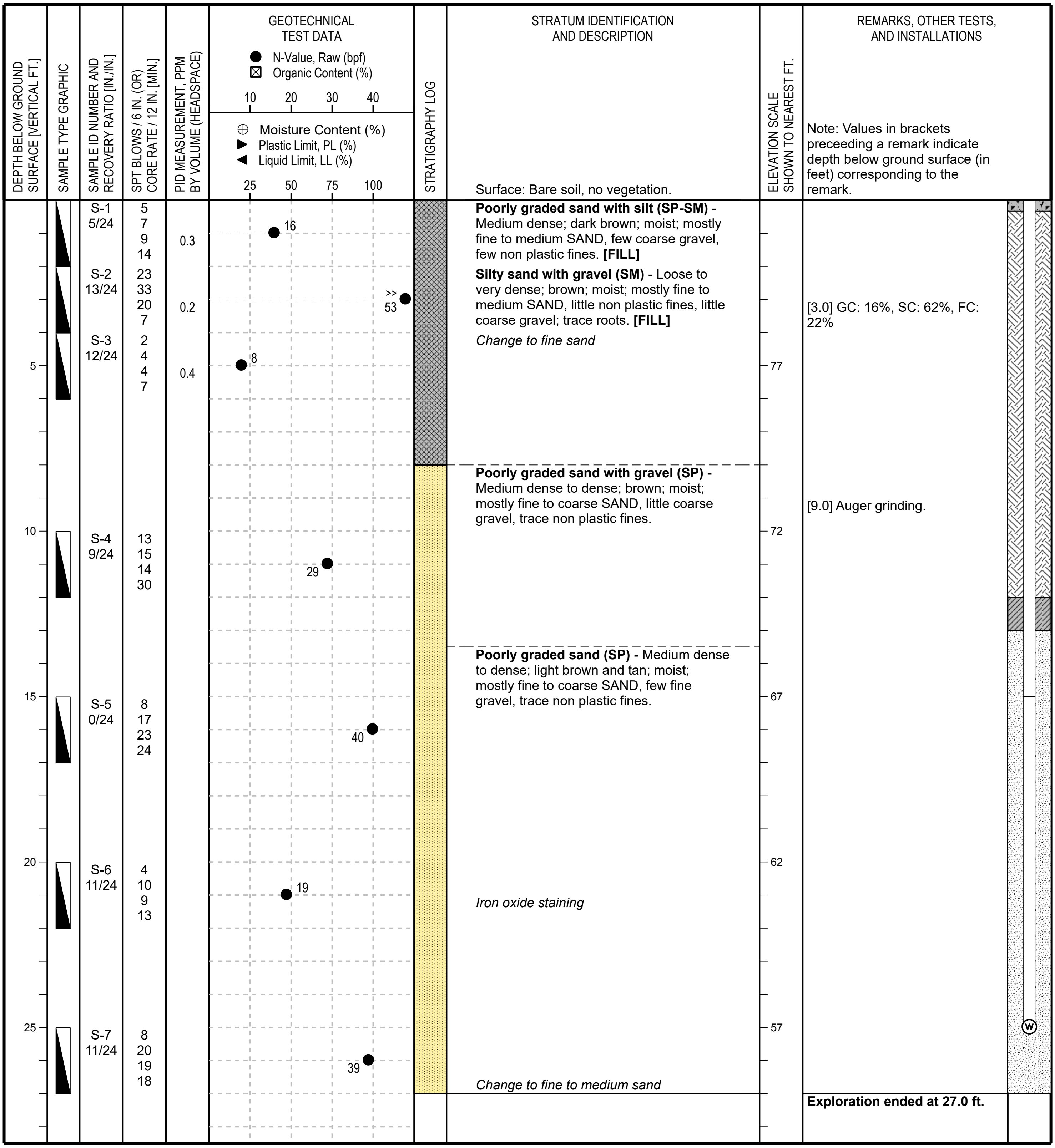
MVRHS Feasibility Evaluation
100 Edgartown Vineyard Haven Rd, Oak Bluffs, MA

BORING ID: B-7 MW

WSE Project: ENG24-0685

Page 1 of 1

CONTRACTOR:	**Northern Drill Service, Inc.**	BORING LOCATION:	**See Attached Figure**	DATE START:	**June 26, 2024**
FOREMAN:	**Tim Tucker**	ADVANCE METHOD:	**Hollow-Stem Auger Drilling**	DATE FINISH:	**June 26, 2024**
LOGGED BY:	**Kathryn Lennon**	AUGER DIAMETER:	**4-1/4" ID (Stem), 7-5/8" OD (Flights)**	GROUND EL:	**82.0 ± (NAVD88)**
CHECKED BY:	**Aaron Chabot, EIT**	SUPPORT CASING:	**N/A**	FINAL DEPTH:	**27.0 ft.**
EQUIPMENT:	**Mobile B-53, ATV Mounted**	CORING METHOD:	**N/A**	GRID COORDS:	**N:152015.6613 / E:1614216.4937**
SPT HAMMER:	**Automatic (140-lb.)**	BACKFILL MATERIAL:	**Monitoring Well Installed**	GRID SYSTEM:	**NAD83 State Plane (MA)**



Sample ID and Recovery Ratio [in./in.]	SPT Blows / 6 in.	PID Measurement, PPM	N-Value, Raw (bpf)
S-1 5/24	5 7 9 14	0.3	16
S-2 13/24	23 33 20 7	0.2	>> 53
S-3 12/24	2 4 4 7	0.4	8
S-4 9/24	13 15 14 30		29
S-5 0/24	8 17 23 24		40
S-6 11/24	4 10 9 13		19
S-7 11/24	8 20 19 18		39

Surface: Bare soil, no vegetation.

Poorly graded sand with silt (SP-SM) - Medium dense; dark brown; moist; mostly fine to medium SAND, few coarse gravel, few non plastic fines. **[FILL]**

Silty sand with gravel (SM) - Loose to very dense; brown; moist; mostly fine to medium SAND, little non plastic fines, little coarse gravel; trace roots. **[FILL]**

Change to fine sand

Poorly graded sand with gravel (SP) - Medium dense to dense; brown; moist; mostly fine to coarse SAND, little coarse gravel, trace non plastic fines.

Poorly graded sand (SP) - Medium dense to dense; light brown and tan; moist; mostly fine to coarse SAND, few fine gravel, trace non plastic fines.

Iron oxide staining

Change to fine to medium sand

Note: Values in brackets preceeding a remark indicate depth below ground surface (in feet) corresponding to the remark.

[3.0] GC: 16%, SC: 62%, FC: 22%

[9.0] Auger grinding.

Exploration ended at 27.0 ft.

Refer to the attached index sheets for important information about this log including general notes, legends, and guidance on description methods and procedures.

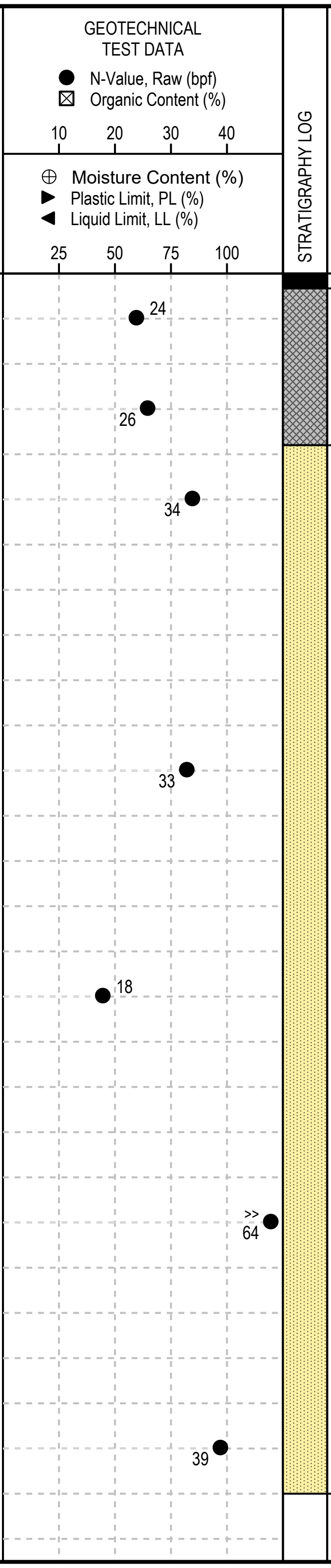
BORING ID: B-8

MVRHS Feasibility Evaluation
100 Edgartown Vineyard Haven Rd, Oak Bluffs, MA

WSE Project: ENG24-0685

Page 1 of 1

CONTRACTOR:	**Northern Drill Service, Inc.**	BORING LOCATION:	**See Attached Figure**	DATE START:	**June 26, 2024**
FOREMAN:	**Tim Tucker**	ADVANCE METHOD:	**Hollow-Stem Auger Drilling**	DATE FINISH:	**June 26, 2024**
LOGGED BY:	**Kathryn Lennon**	AUGER DIAMETER:	**4-1/4" ID (Stem), 7-5/8" OD (Flights)**	GROUND EL:	**75.5 ± (NAVD88)**
CHECKED BY:	**Aaron Chabot, EIT**	SUPPORT CASING:	**N/A**	FINAL DEPTH:	**27.0 ft.**
EQUIPMENT:	**Mobile B-53, ATV Mounted**	CORING METHOD:	**N/A**	GRID COORDS:	**N:151790.3687 / E:1613924.4185**
SPT HAMMER:	**Automatic (140-lb.)**	BACKFILL MATERIAL:	**Drill Cuttings and Asphalt Patch**	GRID SYSTEM:	**NAD83 State Plane (MA)**



DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE ID NUMBER AND RECOVERY RATIO [IN./IN.]	SPT BLOWS / 6 IN. (OR) CORE RATE / 12 IN. [MIN.]	PID MEASUREMENT, PPM BY VOLUME (HEADSPACE)	N-Value, Raw (bpf)	STRATUM IDENTIFICATION AND DESCRIPTION	ELEVATION SCALE SHOWN TO NEAREST FT.	REMARKS, OTHER TESTS, AND INSTALLATIONS
					Surface: Asphalt concrete pavement.		Note: Values in brackets preceeding a remark indicate depth below ground surface (in feet) corresponding to the remark.
	S-1 11/24	26 12 12 8	0.2	24	Asphalt- 4 inches thick. **Poorly graded sand with silt (SP-SM)** - Medium dense; orange and light brown; moist; mostly fine to medium SAND, few non plastic fines, trace fine gravel. **[FILL]**		
	S-2 14/24	6 10 16 16	0.4	26	**Poorly graded sand (SP)** - Medium dense; light brown; moist; mostly fine to medium SAND, few fine to coarse gravel, trace non plastic fines. **[FILL]**		
5	S-3 11/24	6 16 18 22	0.6	34	**Poorly graded sand with gravel (SP)** - Medium dense to dense; tan; mostly fine to coarse SAND, little fine to coarse gravel, trace non plastic fines.	71	
10	S-4 13/24	13 18 15 14	0.2	33	*Change to orange*	66	[11.0] GC: 15%, SC: 77%, FC: 8%
15	S-5 13/24	5 7 11 15		18	*Change to tan and no gravel* *Change to fine to medium sand*	61	
20	S-6 12/24	13 32 32 29		>>64	*Change to orange* *Change to few gravel*	56	
25	S-7 13/24	12 20 19 18		39	*Change to fine to coarse sand*	51	
							Exploration ended at 27.0 ft.

Refer to the attached index sheets for important information about this log including general notes, legends, and guidance on description methods and procedures.

Attachment C

Geotechnical Laboratory Test Data

Thielsch
DIVISION OF THE RISE GROUP

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Cranston RI, 02910
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thielsch.com
Let's Build a Solid Foundation

Client Information:
Weston & Sampson
Foxborough, MA
Project Manager: Stefanie Bridges
Assigned By: Stefanie Bridges
Collected By: Client

Project Information:
Martha's Vineyard Regional High School Feasibility Evaluation
100 Edgartown Vineyard Haven Road, Oak's Bluff, MV
Project Number: ENG24-0685
Summary Page: 1 of 1
Report Date: 07.15.2024

LABORATORY TESTING DATA SHEET, Report No.: 7424-G-B015

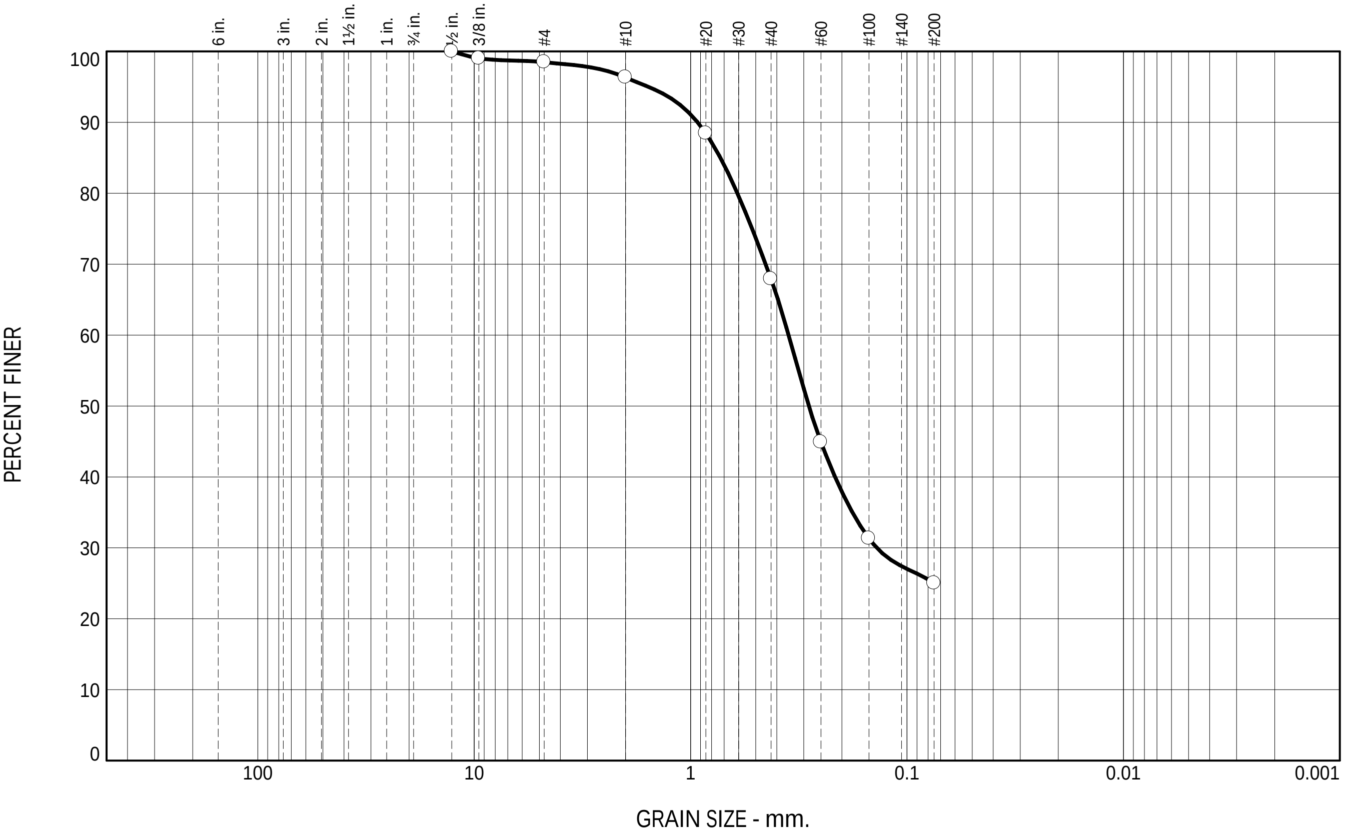
Boring ID	Sample No.	Depth (ft)	Laboratory No.	Identification Tests								Proctor / CBR / Permeability Tests								Laboratory Log and Soil Description
				As Rcvd Moisture Content %	LL %	PL %	Gravel %	Sand %	Fines %	Org. %	pH	g_d MAX (pcf) W_{opt} (%)	g_d MAX (pcf) W_{opt} (%) (Corr.)	Dry unit wt. (pcf)	Test Moisture Content %	Target Test Setup as % of Proctor	CBR @ 0.1"	CBR @ 0.2"	Permeability cm/sec	
				D2216	D4318		D6913			D2974	D4792	D1557								
B-1	S-2	2-4	24-S-B1106				1.5	73.5	25.0											Light Brown f-m SAND, some Silt, trace fine Gravel
B-2	S-3	4-6	24-S-B1107				7.2	89.8	3.0											Light Brown f-m SAND, trace fine Gravel, trace Silt
B-7	S-2	2-4	24-S-B1108				16.3	61.6	22.1											Brown f-m SAND, some Silt, little coarse Gravel
B-8	S-4	10-12	24-S-B1109				15.2	77.3	7.5											Red-Brown f-c SAND, little f-c Gravel, trace Silt

Date Received: **07.08.2024**

Reviewed By: Ronelle LeBlanc

Date Reviewed: **07.15.2024**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.5	2.2	28.4	42.9	25.0	

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1/2"	100.0		
3/8"	99.0		
#4	98.5		
#10	96.3		
#20	88.4		
#40	67.9		
#60	44.9		
#100	31.3		
#200	25.0		

* (no specification provided)

Soil Description

Light Brown f-m SAND, some Silt, trace fine Gravel

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.9280 D_{85}= 0.7283 D_{60}= 0.3527
D_{50}= 0.2842 D_{30}= 0.1379 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

Source of Sample: B-1 Depth: 2-4'
Sample Number: S-2

Date: 07.11.2024

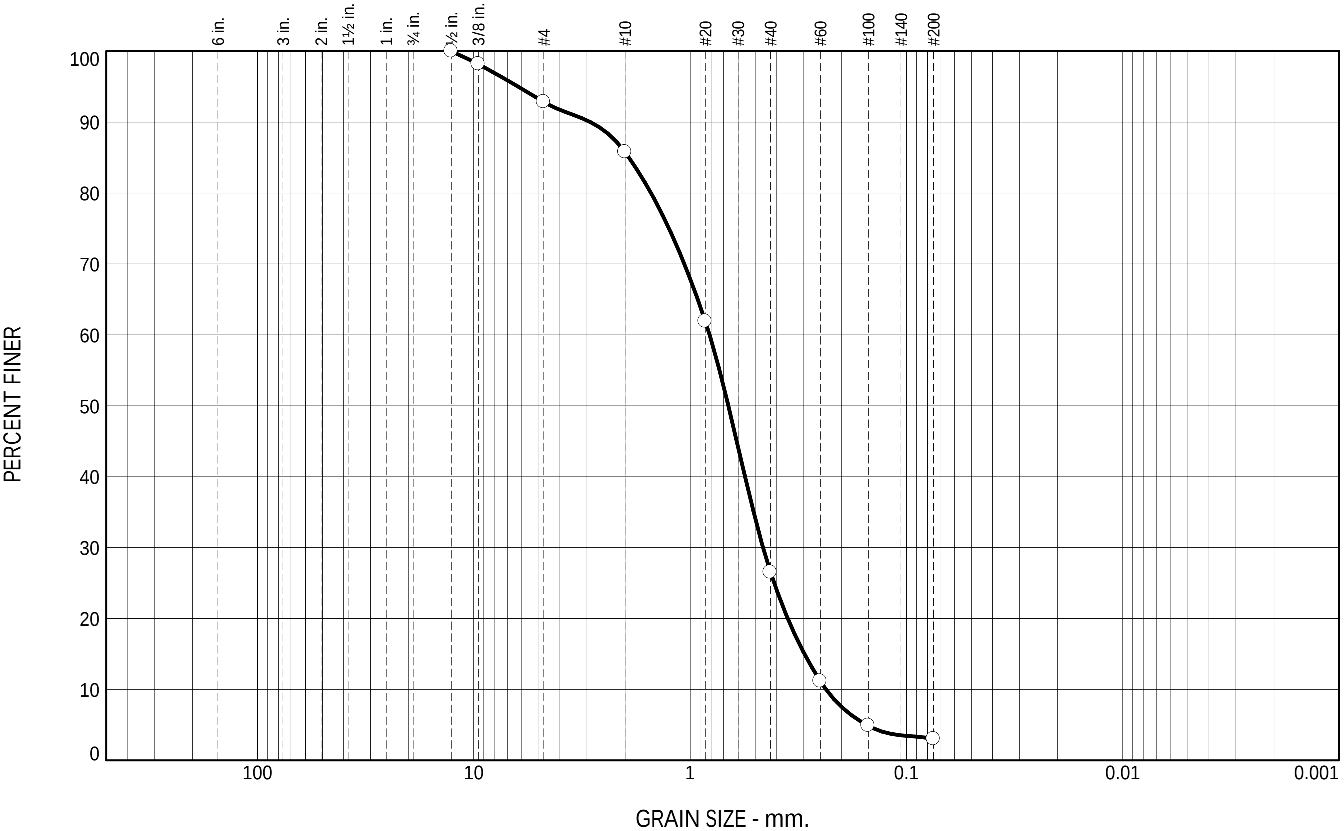
Thielsch Engineering Inc.

Cranston, RI

Client: Weston & Sampson
Project: Martha's Vineyard Regional High School Feasibility Evaulation
100 Edgartown Vineyard Haven Road, Oak Bluffs, MV
Project No: ENG24-0685 Figure 24-S-B1106

Tested By: MF / SF Checked By: Ronelle LeBlanc

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	7.2	7.0	59.3	23.5	3.0	

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1/2"	100.0		
3/8"	98.2		
#4	92.8		
#10	85.8		
#20	61.9		
#40	26.5		
#60	11.1		
#100	4.9		
#200	3.0		

* (no specification provided)

Soil Description

Light Brown f-m SAND, trace fine Gravel, trace Silt

Atterberg Limits

PL= NP
LL= NV
PI= NP

Coefficients

D_{90}= 2.8888
D_{85}= 1.9182
D_{60}= 0.8123
D_{50}= 0.6659
D_{30}= 0.4604
D_{15}= 0.2962
D_{10}= 0.2355
C_u= 3.45
C_c= 1.11

Classification

USCS= SP
AASHTO= A-1-b

Remarks

Source of Sample: B-2
Depth: 4-6'
Sample Number: S-3

Date: 07.11.2024

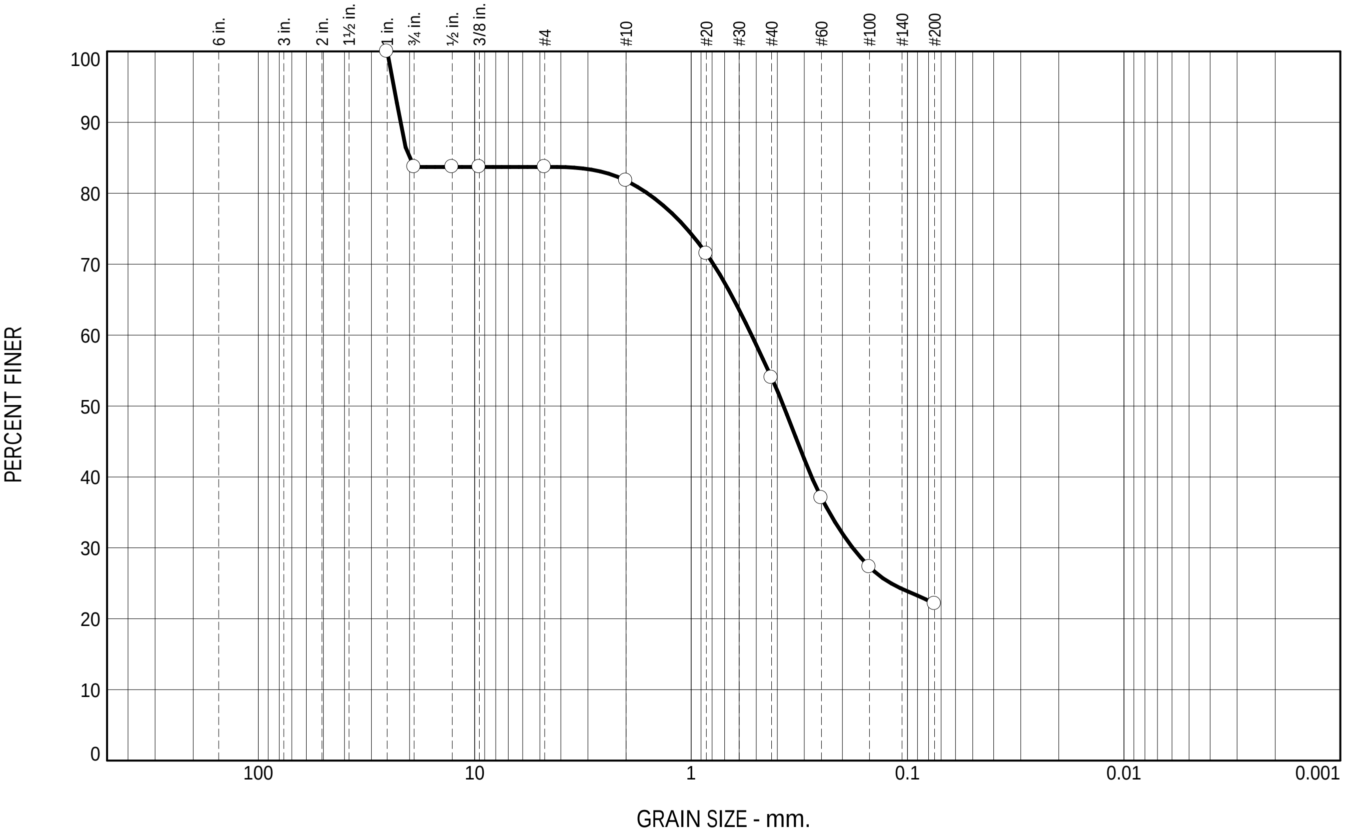
Thielsch Engineering Inc.

Cranston, RI

Client: Weston & Sampson
Project: Martha's Vineyard Regional High School Feasibility Evaulation
100 Edgartown Vineyard Haven Road, Oak Bluffs, MV
Project No: ENG24-0685
Figure 24-S-B1107

Tested By: MF / SF
Checked By: Ronelle LeBlanc

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	16.3	0.0	1.9	27.8	31.9	22.1	

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	83.7		
1/2"	83.7		
3/8"	83.7		
#4	83.7		
#10	81.8		
#20	71.5		
#40	54.0		
#60	37.0		
#100	27.3		
#200	22.1		

* (no specification provided)

Soil Description

Brown f-m SAND, some Silt, little coarse Gravel

Atterberg Limits

PL= NP
LL= NV
PI= NP

Coefficients

D_{90}= 22.0521
D_{85}= 20.2357
D_{60}= 0.5257
D_{50}= 0.3739
D_{30}= 0.1792
D_{15}=
D_{10}=
C_u=
C_c=

Classification

USCS= SM
AASHTO= A-2-4(0)

Remarks

Source of Sample: B-7
Depth: 2-4'
Sample Number: S-2

Date: 07.11.2024

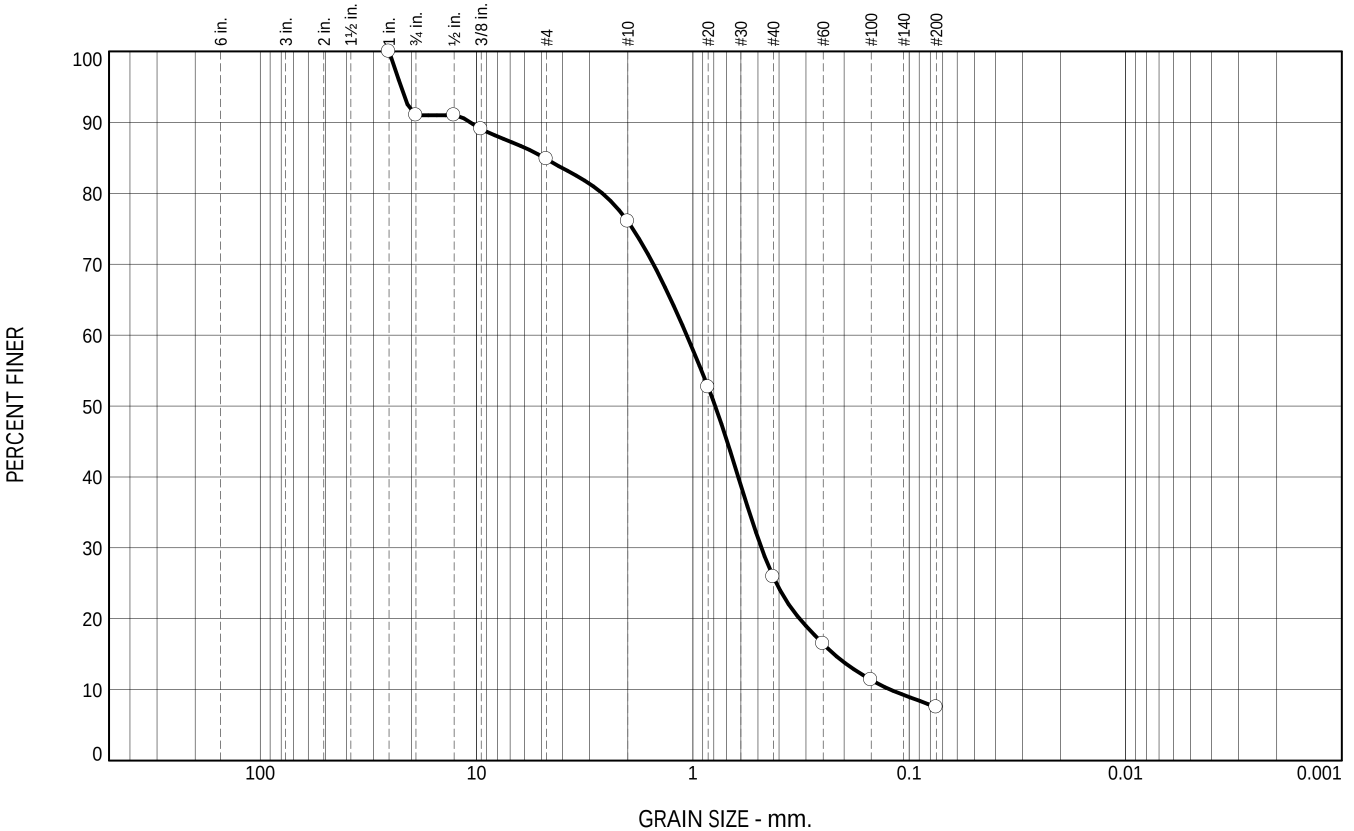
Thielsch Engineering Inc.

Cranston, RI

Client: Weston & Sampson
Project: Martha's Vineyard Regional High School Feasibility Evaulation
100 Edgartown Vineyard Haven Road, Oak Bluffs, MV
Project No: ENG24-0685
Figure 24-S-B1108

Tested By: MF / SF
Checked By: Ronelle LeBlanc

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	9.0	6.2	8.8	50.1	18.4	7.5	

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	91.0		
1/2"	91.0		
3/8"	89.1		
#4	84.8		
#10	76.0		
#20	52.7		
#40	25.9		
#60	16.5		
#100	11.4		
#200	7.5		

* (no specification provided)

Soil Description

Red-Brown f-c SAND, little f-c Gravel, trace Silt

Atterberg Limits

PL= NP
LL= NV
PI= NP

Coefficients

D_{90}= 10.6807
D_{85}= 4.8559
D_{60}= 1.0689
D_{50}= 0.7879
D_{30}= 0.4822
D_{15}= 0.2227
D_{10}= 0.1221
C_{u}= 8.76
C_{c}= 1.78

Classification

USCS= SW-SM
AASHTO= A-1-b

Remarks

Source of Sample: B-8
Depth: 10-12'
Sample Number: S-4

Date: 07.11.2024

Thielsch Engineering Inc.

Cranston, RI

Client: Weston & Sampson
Project: Martha's Vineyard Regional High School Feasibility Evaulation
100 Edgartown Vineyard Haven Road, Oak Bluffs, MV
Project No: ENG24-0685
Figure 24-S-B1109

Tested By: MF / SF
Checked By: Ronelle LeBlanc

Attachment D

“Important Information about your Geotechnical Engineering Report” by GBA, Inc.

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, you can benefit from a lowered exposure to problems associated with subsurface conditions at project sites and development of them that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed herein, contact your GBA-member geotechnical engineer. Active engagement in GBA exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Understand the Geotechnical-Engineering Services Provided for this Report

Geotechnical-engineering services typically include the planning, collection, interpretation, and analysis of exploratory data from widely spaced borings and/or test pits. Field data are combined with results from laboratory tests of soil and rock samples obtained from field exploration (if applicable), observations made during site reconnaissance, and historical information to form one or more models of the expected subsurface conditions beneath the site. Local geology and alterations of the site surface and subsurface by previous and proposed construction are also important considerations. Geotechnical engineers apply their engineering training, experience, and judgment to adapt the requirements of the prospective project to the subsurface model(s). Estimates are made of the subsurface conditions that will likely be exposed during construction as well as the expected performance of foundations and other structures being planned and/or affected by construction activities.

The culmination of these geotechnical-engineering services is typically a geotechnical-engineering report providing the data obtained, a discussion of the subsurface model(s), the engineering and geologic engineering assessments and analyses made, and the recommendations developed to satisfy the given requirements of the project. These reports may be titled investigations, explorations, studies, assessments, or evaluations. Regardless of the title used, the geotechnical-engineering report is an engineering interpretation of the subsurface conditions within the context of the project and does not represent a close examination, systematic inquiry, or thorough investigation of all site and subsurface conditions.

Geotechnical-Engineering Services are Performed for Specific Purposes, Persons, and Projects, and At Specific Times

Geotechnical engineers structure their services to meet the specific needs, goals, and risk management preferences of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client.

Likewise, geotechnical-engineering services are performed for a specific project and purpose. For example, it is unlikely that a geotechnical-engineering study for a refrigerated warehouse will be the same as one prepared for a parking garage; and a few borings drilled during a preliminary study to evaluate site feasibility will not be adequate to develop geotechnical design recommendations for the project.

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project or purpose;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, the reliability of a geotechnical-engineering report can be affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying the recommendations in it. A minor amount of additional testing or analysis after the passage of time – if any is required at all – could prevent major problems.

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read the report in its entirety. Do not rely on an executive summary. Do not read selective elements only. *Read and refer to the report in full.*

You Need to Inform Your Geotechnical Engineer About Change

Your geotechnical engineer considered unique, project-specific factors when developing the scope of study behind this report and developing the confirmation-dependent recommendations the report conveys. Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the elevation, configuration, location, orientation, function or weight of the proposed structure and the desired performance criteria;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project or site changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept* *responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface using various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing is performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgement to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team through project completion to obtain informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, they are <u>not</u> final, because the geotechnical engineer who developed them relied heavily on judgement and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* exposed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a continuing member of the design team, to:

- confer with other design-team members;
- help develop specifications;
- review pertinent elements of other design professionals' plans and specifications; and
- be available whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction-phase observations.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for information purposes only.* To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. This happens in part because soil and rock on project sites are typically heterogeneous and not manufactured materials with well-defined engineering properties like steel and concrete. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are <u>Not</u> Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually provide environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures.* If you have not obtained your own environmental information about the project site, ask your geotechnical consultant for a recommendation on how to find environmental risk-management guidance.

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, the engineer's services were not designed, conducted, or intended to prevent migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will <u>not</u> of itself be sufficient to prevent moisture infiltration. Confront the risk of moisture infiltration*** by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are <u>not</u> building-envelope or mold specialists.***

GEOPROFESSIONAL
BUSINESS
ASSOCIATION

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